MODERN FRUIT MARKETING

BLISS S. BROWN

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PICKING APPLES IN A LARGE ORCHARD

MODERN FRUIT MARKETING

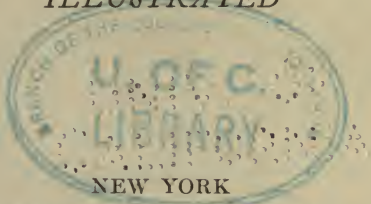
A Complete Treatise Covering Harvesting, Packing, Storing, Transporting and Selling of Fruit

BY

BLISS S. BROWN

Professor of Horticulture in University of Maine

ILLUSTRATED



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INTRODUCTION

AGRICULTURE is the Science, the Art and the Technique of supplying human wants from the products of the soil. This does not exactly correspond with the old definition, but is a readjustment to meet the needs of its modern application. The Latin word *"agri,"* meaning field, and *"horti,"* garden, have long since outgrown their usefulness as a definition for present-day Agriculture or Horticulture. The tendency now is to increase the scope of the word Agriculture to include the Art, the Science, and the Technique of everything pertaining to farm products, and to delimit the meaning of Horticulture within narrower and narrower bounds.

Formerly, Agriculture was considered to be the growing of crops. When this was accomplished, the farmer's results were turned over to another set of people to dispose of as they saw fit. Later, along with production, was considered the problems of distribution, and Agriculture expanded to include this work. Now, the marketing of farm products is everywhere considered as a legitimate part of Agriculture.

The trend of the present leaders in the profession is to go one step farther and include in modern Agricul-

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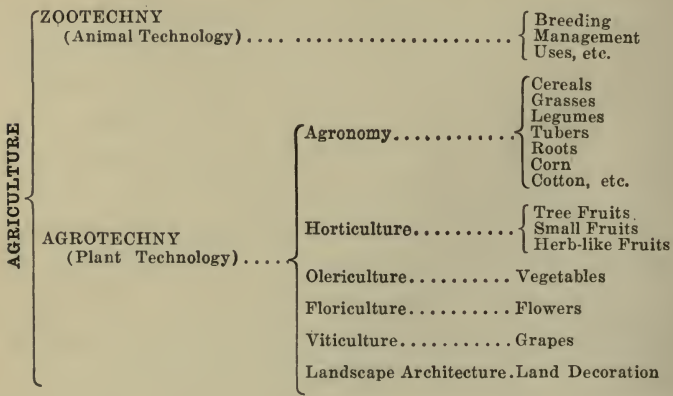
ture the converting of the raw products of the farm into manufactured or finished articles, which supply human wants in the nature of Nourishment, Comforts or Pleasure. This is as it should be, for there is no plausible reason why the manufacture of flour from wheat, or the making of bread from flour is not as important to agriculture as the chemistry or histology of the wheat plant itself. It is just as important to know how to make starch from corn, or cloth from cotton fiber, as it is to grow the plants themselves.

In accordance with this modern interpretation of Agriculture, the following classification is inserted as a prelude to a more extended discussion of the topic.

GENERAL CLASSIFICATION OF AGRICULTURE



CLASSIFICATION OF HORTICULTURE

- **HORTICULTURE**
  - HERB-LIKE FRUITS
    - Banana
    - Pineapple
    - Cherimoyer
    - Pawpaw
  - TREE FRUITS
    - Pomaceous
      - Apples
      - Pears
      - Quinces
    - Drupaceous
      - Peaches
      - Plums
      - Apricots
      - Cherries
      - Almonds
      - Nectarines
    - Citraceous
      - Oranges
      - Lemons
      - Limes
      - Tangerines
      - Citrons
      - Pomelos
      - Kumquats
      - Shaddocks
    - Moraceous
      - Figs
      - Mulberries
    - Nuciaceous
      - Walnuts
      - Pecans
      - Chestnuts
      - Hickories
      - Butternuts
      - Pistachios
      - Hazlenuts
      - Brazilnuts
    - Ebenaceous — Persimmons
    - Oleaceous — Olives
    - Lauraceous — Avocadroes
    - Palmaceous
      - Dates
      - Cocoa Nuts
      - Sago
  - SMALL FRUITS
    - Rubaceous
      - Blackberry
      - Raspberry
      - Dewberry
    - Ribaceous
      - Gooseberry
      - Currants
    - Vaccinaceous
      - Blueberries
      - Huckleberries
      - Cranberries
      - Billberries
    - Fragaceous — Strawberries

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MODERN FRUIT MARKETING

CHAPTER 1

FRUIT HARVESTING OPERATIONS

Picking Operations.—The gathering of fruit from the trees is quite simple in theory yet exceedingly varied in practice. Each section of the country has developed different methods of handling the fruit, depending for the most part upon the demands of the market in which the fruit is sold. In some sections growers are exceedingly careful and use painstaking care in picking and preparing the fruit for market; others are indifferent or are poorly equipped to handle the fruit properly. It not infrequently happens that sections having ideal locations for orchards produce very poor or inferior fruit. Such sections are either overshadowed by some other industry or are lacking in men with intelligence and enterprise to develop them.

Time to Pick.—The time at which the various fruits should be picked will depend upon several factors, such as: (1) The variety or kind of fruit. (2) Distance from market. (3) Maturity of the fruit. (4) The use to which it is to be put. Each variety or kind of fruit is at its best for only a comparatively short time. Some of the softer fruits, like peaches, plums, apricots or berries, are in their prime only four or five days, while apples, pears, etc., will often keep for months. The efforts in all cases should be to have the fruit reach the consumer while in its best prime condition.

Deciduous fruit shipped from the Pacific Coast to the Eastern markets consumes about 14 days in transit; from Texas about eight; from Georgia or Alabama about four; while in most of the New England or Atlantic states the fruit is picked one day and is in the hands of the consumer the next. This gives the Eastern states an enormous market advantage for their fruit, and were it not for the fact that the seasonal differences allow the Southern and Far Western states to ripen their fruit from 10 to 30 days ahead of the north, they would be shut out entirely from the eastern markets.

The long time elapsing between the picking and consuming of the more perishable fruits where the long haul is necessary, compels much of it to be picked before it is sufficiently mature to ripen in the best prime condition. Then, too, the great rush among some of the southern growers to get the first fruit on the market and thus secure the highest prices furnishes an undue incentive to pick half mature fruit. Such fruits as peaches, plums, apricots, and grapes thus picked arrive in the northern markets in poor condition. They are lacking in flavor, are acid, flat, and often insipid. Such have had much to do in creating an impression among the consumers in the big cities that certain sections cannot produce fruit as high in quality or flavor as the Northern states.

When to Pick.—The time to pick fruit is largely a matter of judgment. Much has been said and written upon this subject but very little of it is of practical value to the beginner. The maturity of the seed is often given as an indication of the proper time to pick, but this is of little value to the practical man, because the

picker, who is not familiar with the fruit as a rule, will not be able to tell when the seeds are mature.

Some varieties have seeds that are very dark when the picking time arrives, other kinds have white or slightly colored seeds, and to use these as a guide, one would need to be familiar with all of the different kinds of fruit. Also, in regard to the color of the fruit: it has often been said that red fruit should get a high

Fig. 2.—HARVESTING PEACHES IN GEORGIA

color before harvesting. This is true only in a general way, because a fruit that is highly colored in one section of the country may be more or less lacking in color in others. Take, for example, the common Baldwin; in the north this is a very highly colored fruit, but as you go south into the warmer states, it becomes almost a green apple.

The only way for the beginner to be sure and get the fruit harvested at the right time is to experiment. It is of little value to rely upon the advice of neighbors unless one knows that they have been successful. The person unfamiliar with the harvesting operations can pick a few packages of fruit and send them to market and the returns that he gets will very soon indicate to him whether the fruit arrived in good condition. By keeping in touch with the selling force, be it a commission man or a special agent, he can tell to a much better advantage just when to pick the fruit in order to get it in the hands of the consumer in the best prime condition.

In the Northern states, apples are usually allowed to hang on the trees as late in the fall as climatic conditions will warrant. Most of the growth in size and flavor apparently comes in the last two or three weeks of the growing period in the fall, and if the fruit can be allowed to hang on the trees, it will develop much in size and in quality during this time. The earlier varieties in the North and the other varieties in the South are usually picked when the market conditions are best to receive them. In most states, large quantities of apples are put in storage. This is commendable in many respects, and will be considered more in detail in another place.

Peaches, plums and apricots have to be picked every day or every other day, because the period in which they are at the best is very short. If they are allowed to stay on the tree too long they become soft and do not "stand up" when they reach the market. Pears are almost always picked before they are mature. They

ripen much better in the dark in storage than they do on the trees. Many varieties of pears are ruined by being allowed to remain on the trees too long. They often develop a coarse grain and are full of hard, gritty spicules which give a consumer the impression that he is eating sand. Frequently "water core" appears, and the fruit rapidly deteriorates. When ripened in storage in the dark, these spicules or grit do not develop so much and the fruit keeps much longer.

Cherries are best picked when they are about in the condition to be eaten. If they have to be shipped a long distance they are sometimes picked a little green and, like peaches and apricots, often reach the market in very poor condition. In the famous cherry belt of the Pacific Coast, we often find the growers going through their orchards and picking off a cherry here and a cherry there over hundreds of trees to make up a five or ten-pound package to ship East, and while fruit growers in the Eastern and Northern states are still shoveling snow, these first cherries arrive on the markets in the big cities. Some of them have sold as high as $100 for the first ten pounds. These are largely matters of advertising as such fruit is not usually in very good condition to eat.

Such fruits as olives, oranges and lemons are picked at several different stages, according to the use to which they are going to be put. Lemons are almost always picked according to size and the stem is cut off with the shears. The first of the olives for pickling are carefully removed by hand; after that the olives that go into oil are shaken from the tree and gathered from the ground. Such fruit as figs is allowed to drop naturally

Fig. 3.—A "DRYING FLOOR" FOR PRUNES, SANTA CLARA VALLEY, CAL.
The rainless season makes it possible to dry the fruit on shallow trays in the sun.

from the trees and are then picked up and dried in the sun. Prunes are handled in the same way. Almonds and other nuts are allowed to fall naturally from the trees, or in some cases the almonds are knocked off from the trees and gathered in large canvas sheets spread under the trees. Grapes for shipping long distances are picked by hand, bunches being removed with a shears.

Fig. 4.—"KNOCKING ALMONDS," SACRAMENTO VALLEY, CAL.

Those that are dried for raisins, or go into the wine and grape juice industries, are pulled off more or less roughly from the vines.

Persimmons are usually allowed to hang on the trees until frost, because before this time they are so astringent that they have no particular market value. In the Gulf states many of the persimmons dry on the trees

and, after being thus dried, are removed by hand. Through it all, there is one general rule to keep in mind: That all first or second quality fruit should be picked by hand and handled with every possible care.

Stems On or Off.—Different sections of the country have different ways of handling the fruit, but the custom is generally to pick all of the more perishable fruits with the stems on. Every stem that is pulled out of a fruit breaks the skin, and this allows an entrance for some of the decay organisms. Some fruits separate naturally from the stem, while in others it is quite difficult to remove the fruit and keep the stem with it. With some of the more tender fruits, such as strawberries and sweet cherries, the fruit is picked with the stem on. In order to do this the thumb and finger is placed each side of the stem itself, the hand not touching the fruit.

This entails considerable care on the part of the picker, but in actual practice has always been found successful. In the United States, the fruits that are picked with the stems on are more or less the same in all of the different fruit-growing sections. The following list includes the more common fruits which are picked with the stems on or off.

STEMS WITH REGARD TO COMMON PRACTICE

Stems on		*Stems off*	
Apple	Plum	Orange	Raspberry
Pear	Persimmon	Pomelo	Blackberry
Quince	Grape	Peach	Dewberry
Cherry	Strawberry	Apricot	Almond
Lemon	Currant	Prune	Walnut
Citron	Fig	Olive	
Lime			

Care in Picking.—In removing the fruit from the trees too much cannot be said in regard to the care in handling. Much fruit is ruined by carelessness in picking. Often fruit is dropped into receptacles, poured roughly into boxes or barrels, jolted over rough roads in wagons without springs and in many ways handled so carelessly that fully 50 or 75% of its market value is wasted. A good picker should always work with both hands. The fruit is grasped in the palm of the hand and not between the thumb and finger. Often a very slight pull is sufficient to remove the fruit, but in some of the more persistent varieties, a twist and an upward lift at the same time is necessary to get it off without pulling on the stems. Good apples or fruit of any kind should never be dropped or poured from one basket to another. Every effort is made to handle the fruit as carefully as possible, usually picking the fruit from one package to another like an egg-sorter would handle eggs. To the fruit grower who is familiar with the different methods of picking, nothing is more disgusting than to see a person step up to a nice peach or apple and stick his thumb through the skin to see if it is soft enough to eat. This almost invariably indicates ignorance or gross carelessness.

Succession of Pickings.—In many apple sections, what is commonly known as a "succession of pickings" is made. By this is meant the going over of the trees several times, picking first the fruit which is the right size and the best colored and then, a few days later, repeating the process. This is an accepted rule among deciduous fruit growers of plums, peaches, etc., but is not generally practiced in the Northern or Eastern states

among the apple growers. In Washington and Oregon this is quite often done, and it has been found by experiment that fruit that is entirely too small to be considered as a saleable product at the first picking would in two weeks time be large enough to go into a first grade. Where the growers are carrying on very intensive orcharding the practice of successive pickings should be recommended. The weather conditions some-

a *b* *c*

Fig. 5.—TYPES OF PICKING RECEPTACLES
a—Pulp pail; *b*—woven splint basket; *c*—wide splint basket.

times militate against doing this successfully, but many times it will greatly increase the quality as well as the quantity of the fruit harvested.

Picking Receptacles.—For the most part, orchardists like best the ordinary splint basket to pick the fruit in. There are a number of these picking baskets on the market, and most of them are fairly satisfactory. One holding about half a bushel is the best size. The handle ought to be fastened on the outside so as to swing clear

of the basket. This facilitates the emptying of apples into a barrel. Baskets having the wide splints and a smooth interior are the best. (Fig. 5 *c.*) Those having a woven (Fig. 5 *b.*) splint work are not recommended because of the many sharp corners on the inside. It is usually not practical to line such baskets with burlap, because the small particles of bark, grit and dirt will stick into the burlap, and the sharp corners break or puncture the skin. A very small puncture will often cause decay as quickly as a large bruise.

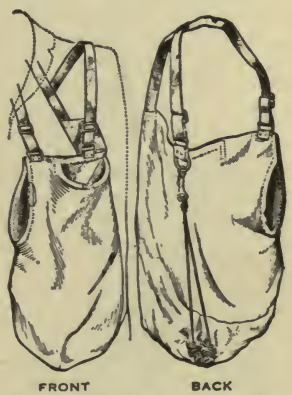


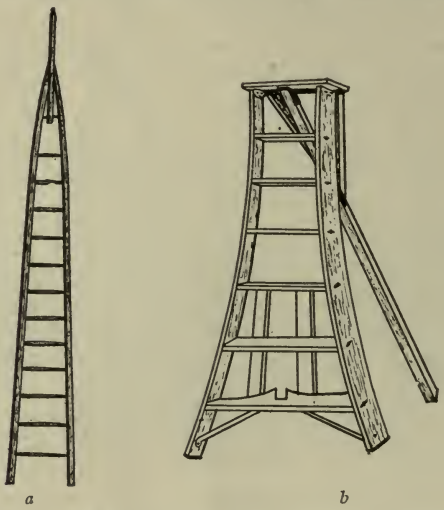
Fig. 6.—A HANDY PICKING BAG

Not as good as basket.

Picking Bags. — Various kinds of picking bags are also in use. These, for the most part, are not to be recommended, especially those that are all constructed of cloth or canvas. Some of the picking bags have a wooden piece around the top which will help protect the fruit. These are better than the other kind. The great objection to a picking bag is that in climbing over a ladder or through a tree, the fruit is often bruised through the bag. Small particles also collect on the inside of the bag the same as they do on the burlap-lined basket, and the sharp corners of the very fine particles tend to puncture the skin of the fruit.

In some places, tin pails or wooden pails (Fig. 5 *a.*) are used. These are very satisfactory if rightly handled. A tin pail, as long as it is new and flexible, is a good pick-

ing receptacle. After it becomes rusty, it may best be discarded. One advantage of a tin pail is that a foreman or superintendent could tell for quite a distance whether his men were handling the fruit carefully or not by the amount of noise made in the pail. In many of the



a *b*

Fig. 7.—DESIRABLE FRUIT PICKING LADDERS
a—Pointed rung ladder; *b*—three-legged step-ladder.

Western states deciduous fruits, such as peaches, plums, etc., are picked in these pails.

There are also to be found on the market various types of special picking tools. These are usually arranged on some kind of a pole or long handle with a basket or cuplike affair on the end to catch the fruit and remove it from the tree. Sometimes there are little knives to cut off the stems of the fruit; occasion-

ally there are wire claws which are supposed to pull off the fruit. Some of them have long tube-like sacks made of cloth through which the fruit can roll down and be caught in a receptacle at the lower end. On a commercial basis none of these fruit-picking tools have ever proved successful. They are good for sampling or for picking specimen fruit for shows, etc., but are altogether too slow for commercial work.

Ladders. — There are but two kinds of ladders commercially used in an orchard. One, the common step-ladder (Fig. 7 *b*.), the other the long or rung-ladder (Fig. 7 *a*.). The step-ladders are about 8 or 10 feet high, and have only three legs. The third leg is reinforced at the top by braces and comes to a point on the ground. This is necessary because of the general unevenness of the orchard land. The three-legged ladder can always maintain an even position while it is usually difficult to properly set a four-legged ladder. The rung or long ladders are made of light material and always small enough so that one man can handle them alone. It is a waste of time to

Fig. 8.—A CONVERTIBLE STEP-LADDER

use a big ladder that two people will have to move. The top end or point should be drawn together so as to enable it to be pushed up through the limbs or the branches. A square top on the ladder is always catching on the limbs and knocking off the fruit. The rungs are made as large as possible, because it is tiresome work for a picker to stand all day on small pins, and the more one can contribute to the comfort of the picker, the better work he will do.

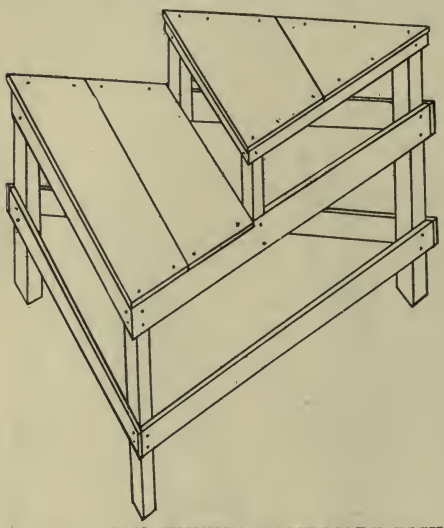


Fig. 9.—A CONVENIENT HOME-MADE PICKING LADDER FOR LOW-HEADED TREES

Disposition of the Fruit. — It has been customary among the growers of the Northern and Eastern states to put the apples on the ground in piles, protected from the soil by a little straw. These have been allowed to remain in the pile for several weeks, and frequently have been graded and packed in barrels direct from these piles. The argument in favor of this method was that the fruit which had started to decay would be discovered when it was regraded and could be thrown out. This, however, no longer applies, because if

the fruit is carefully handled, the bad or bruised ones will be very few and can be easily thrown out when the grading is done. It is now customary to place all of the fruit, as fast as it is picked, in either barrels or boxes and then remove it immediately to storage or to the packing-house.

Fig. 10.—TYPE OF PICKING LADDER USED IN THE NORTH WESTERN U. S.

The western people favor the box (Fig. 11). If they do not care to take the regular packing-box into the field, they provide what is known as the "lug" box holding about 50 pounds each. Fruit is put into these, placed on a low wagon (Fig. 12), and taken immediately to the packing-house. It is then packed direct from these boxes, hence no pouring, or little handling of the fruit is necessary. The Eastern fruit growers are gradually adopting the box method, and in a few years it is probable that the barrels will be largely replaced by boxes. However, the barrel can be used to good advantage, and is quite a convenient receptacle in which to move the apples from the orchard to the packing-house. As soon

as the fruit is picked from the tree, it is placed in these boxes or barrels and set in the shade. The same day or night it is removed to the grading-house. In some of the warmer sections of the country, the fruit is hauled away early in the morning, allowing the night time for it to cool down as much as it will.

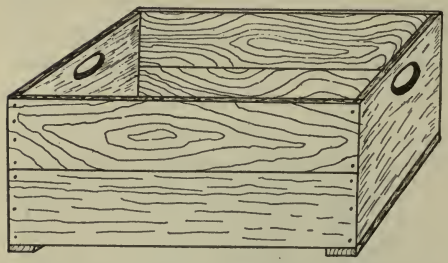


Fig. 11.—FIELD FRUIT BOX, OR "LUG" BOX
Ends, ⅞"; sides, ½" thick; size, inside, 26½" x 13½" x 11¾".

Moving the Fruit.—In transferring the fruit from the orchard to the packing-house or storage cellar, considerable attention will need to be paid to the wagon on

Fig. 12.—A VERY CONVENIENT WAGON FOR MOVING THE FRUIT FROM THE ORCHARD

which it is moved. In the first place, the wagon ought to have low wheels and a flat bed extending out over the wheels. The energy that is used in lifting barrels or boxes up into a high wagon is wasted, and besides, some of the fruit may be bruised in this way. If an

Fig. 13.—A "THREE DECKER" FRUIT WAGON FOR LONG HAULS

ordinary wagon is used, it ought to be a low-wheeled one with springs under the bed to keep the fruit from being bruised. For moving barrels one of the common drop-axle wagons is best. In such a wagon the bed runs only 18 or 20 inches from the ground and it is quite easy for two men to handle the barrels. On side hills or on very rough land where it is not feasible to use a wagon, some kind of a boat or sled is necessary. Usually such a conveyance is easily made on the farm. The fruit is allowed to slide down the hills to the perma-

nent roads where it may be transferred to the fruit wagons. The spring wagon is not only necessary for orchard work, but also for carrying the fruit from the packing-house to the railway or shipping points.

Managing Pickers.—When one begins to offer suggestions upon the management of help on a fruit farm he is immediately piling upon himself criticisms from various sources, because the labor question in connection with fruit growing is becoming one of the most serious problems connected with the business. In sections of the country where large areas are devoted to fruit, it is often exceedingly difficult to get competent help for harvesting or handling the fruit. Often, in small areas more or less isolated from the larger centers of population, growers have to abandon their fruit because of the cost of labor or the lack of sufficient help.

Tramp Labor.—In the larger fruit sections of the Western and Middle states, most of the day labor consists of the great floating population which is popularly known as "tramps or hobos." Such labor, although not the best, is usually the class that has to be relied upon in harvesting fruit crops. These floating laborers will winter either in the South or in the big cities of the East. In the spring they drift South and begin picking fruit at the opening of the season in the Southern states and then gradually work north until the season closes and they find themselves in the North as far as the fruit industry extends; drifting back to the South or to the big cities to spend the winter. Much of this help is unreliable and uncertain, and each fruit-producing section has to work out the problem of harvesting its fruit according to the needs of its own particular locality.

Day Labor.—Unless an owner has help that he knows to be reliable, it is not good policy to hire by the month or by the box. The best results are obtained from day labor. In such cases the workmen know they get so much pay for so many hours work, and are not inclined to hurry or to bruise or spoil the fruit. Occasionally, some growers like to have the fruit picked by the tree or on a contract job for the whole orchard. This very

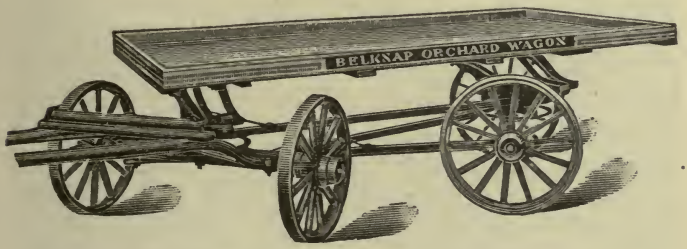


Fig. 14.—A COMBINED ORCHARD AND DELIVERY WAGON FOR SMALL ORCHARD

often does not prove to the best interest of the producer. Much of the fruit is spoiled, some of it is skipped and left on the trees, while limbs are split down and the trees generally despoiled.

Small Fruits by Quart.—Small fruits are most always picked by the quart because there is always a foreman or superintendent to inspect each quart as they come in, and in case the workman is not picking properly he can be dealt with at the time.

Prices Paid.—For small fruits the price varies per quart in the different states and, in some cases, different sections of the same state. In New Jersey, for straw-

berries it is customary to pay 1½ cents a quart; in Michigan, about the same; while in New England states, 2 cents is often paid. In the case of the raspberry or blackberry, often as high as 3 or 4 cents a quart is paid.

Keeping Records.—Where berries or fruit are picked by the quart it is necessary to have some system of keeping records. This is usually done by means of

Fig. 15.—A BAND OF APPLE PICKERS IN MAINE

tickets. Small pasteboard tickets, on which are printed the various number of quarts, are handed out to the pickers as they bring in their carriers of berries. Some of the tickets have several numbers marked around the border and a place in thé center to write the picker's name, and as the berries are brought in, the superintendent or foreman punches out the number corresponding with the number of quarts brought.

This method has not always proved satisfactory be-

cause of the ease in which mistakes occur or in which the picker might imitate the punch marks. Where the smaller quart tickets are used there ought to be some mark on them to prevent them being duplicated. This can be done by having engraved on them the signature of the owner.

CHAPTER II

PREPARING THE FRUITS FOR MARKET

The Packing-House.—Almost all fruits are arranged for market in some kind of a packing-house, and this is usually necessary. Fruit ought not to be exposed to the sun during the day and, in the Northern states, where apples are harvested late, they must be protected at night from extreme and varying temperatures. This may best be done in a specially designed packing-house.

For small fruits in the Northern states, and for some of the tree-fruits in the South, the only packing-house that is necessary is four posts set up in the orchard, with a wood or canvas roof to keep out the sun and give a comfortable place for the workmen to grade and pack the fruit. The old practice of packing fruit, especially apples, in dark cellars under dwellings, is decidedly unpractical. In the first place, they are always dark and usually damp and uncomfortable places for the men to work; besides large quantities of fruit stored under a residence is not good for the health of the family living above.

Where more than 30 or 40 barrels of fruit are to be harvested and stored, some kind of a special cellar and packing-house is provided. In large orchards these may be erected in the orchard itself. In other places it is put up near the other buildings of the farm, making it convenient to the residence and so far as possible

easy to get the fruit to and from the house. A small building 20 x 24 feet is large enough to accommodate 200 to 250 barrels of fruit. This may be constructed in two stories; a basement below, well insulated for protection from winter colds, and a story above for the grading and packing of the fruit. If an attic can be

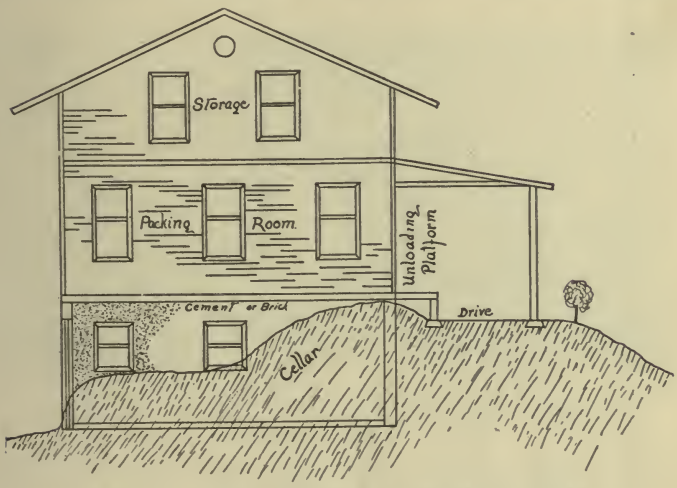


Fig. 16.—PACKING-HOUSE AND STORAGE CELLAR
1,000 bbls. capacity. 30 x 40 ft.

added, this will greatly facilitate the storing of empty packages, fruit boxes, etc., during the summer. Such a building is of the nature of a permanent improvement to the place, and while not costing a great amount it is a decided advantage. Besides being used for apples or other fruit, it may in other ways be used to good advantage during the summer. Such a building may be arranged in different ways to suit the convenience of

the particular locality, or increased in size to accommodate much larger quantities of fruit.

Central Packing-Houses.—Many places in the United States where the fruit areas are large, growers do not

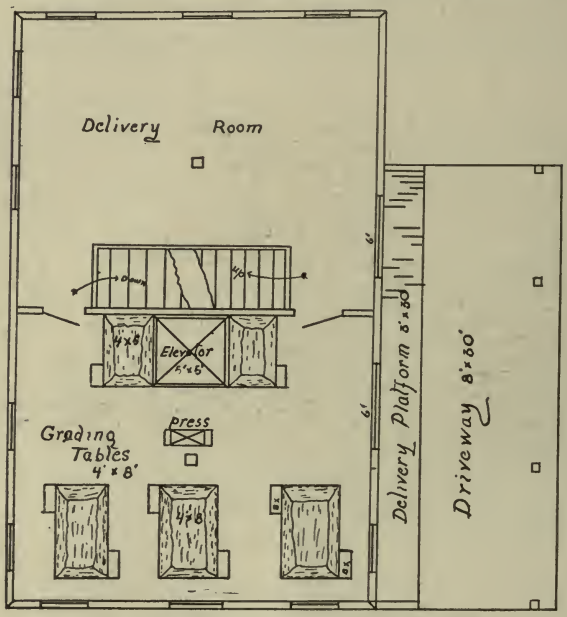


Fig. 17.—PLAN OF PACKING ROOM
30 ft. x 40 ft.

pack their own fruit. This is especially true where cooperative organizations are in vogue. It has been found by experience that the average grower cannot pack his own fruit and maintain a uniform package from year to year. Each grower has a little different standard as his own. Hence, some of the cooperative organiza-

tions have designed a simple warehouse or packing-house to which all the fruit is brought. There it is packed by experts. This insures a much greater degree of uniformity and enables the cooperative organizations to guarantee a standard grade or pack.

Many of the Western fruit organizations have these central packing-houses and it is from the success of

Fig. 18.—DELIVERING PEACHES TO A PRIVATE PACKING-HOUSE IN GEORGIA

these that their use has spread to many of the Eastern states. It is quite probable, however, that this method is better suited to the Central and Western states than to the far East, because the areas adapted to fruit growing in the East are usually so scattered that a central packing-house would not draw enough fruit to make it pay. A large packing plant of this kind costs several hundred dollars, and to be a paying proposition, large quantities of fruit must be handled.

Dividing into Grades.—Before attempting to explain the way fruit is graded, it is necessary to give a clear

idea of what makes up a grade. The grades of fruit might be defined as a division into classes, according to a certain custom or law. In the past there never has been any very definite conception of just what a standard grade should be. This led to a great multiplicity of marks to represent grades. In fact, they have appeared on the market in such numbers that they scarcely mean

Fig. 19.—CENTRAL PACKING-HOUSES FOR ORANGES IN A SMALL SOUTHERN CALIFORNIA TOWN

anything to the consuming public. What would mean a fancy grade under one mark in one section of the country, might be a very poor grade when coming from another section. Only last year on the Liverpool market in England, 35 different brands representing supposedly standard grades, were found on packages imported from the United States and Canada. Under such conditions, it has been necessary for the buyer to open the package and examine the fruit personally.

For the past 10 or 15 years certain progressive fruit

growers have attempted to establish standard grades for the different kinds of apples, that would be recognized on the general market. Still further they have attempted to guarantee these brands or grades and if not found up to standard, as per guarantee, the purchasing price would be returned to the buyer. A cooperative

Fig. 20.—CORNER IN A PACKING-HOUSE
Showing table on which grading and sorting is done.

organization in the West led in the establishing of uniform grades. It worked out a set of rules defining the grades and gave instructions to growers or packers explaining the way to handle fruit in order to conform with these standard grades.

This plan worked so well on a limited scale that other organizations took the matter up, and recently a number of states have enacted laws covering or defining stan-

dard grades. Such laws in the East have been hard to enact because the growers or producers of fruit have not been in the habit of taking very great pains with their fruit or their orchards. A great quantity of poor fruit has been offered for sale for whatever it would bring, and little effort has been put forth to improve the quality. Under such conditions, the farmers have opposed the enacting of such a law. Even the government has hesitated in making a law that would affect the fruit industry as a whole. Their argument has been that conditions differ so greatly in different states that no law which would affect all alike could be made. However, a federal law was passed establishing a standard barrel and describing how such fruit shall be marked or the package labeled. Up until 1914 this law was not enforced because there was no penalty for its disobeyance and the public was not compelled to use it. It is interesting to note that while the Western states have been the leaders in establishing these standard grades, they have been the last to enact laws compelling their use.

The following are some of the names that apply to the different grades of apples as enacted into law by a number of the Eastern states.

MAINE LAW:

Fancy Apples	2½″ up
No. 1 or Class 1	2¼″ to 2½″
No. 2 or Class 2	2 ″ to 2¼″
Unclassified	No size

NEW YORK STATE LAW:

Fancy Grade
Standard "A" grade.
Standard "B" grade. No sizes.
Unclassified.

U. S. APPLE LAW:

Standard grade, minimum size, 2½".
Standard grade, minimum size, 2¼".
Standard grade, minimum size, 2 ".

CANADIAN LAW:

No. 1 or XXX. No sizes specified.
No. 2 or XX. No sizes specified.
No. 3 or X. No sizes specified.
Culls.

It will be noted in studying over the requirements of these laws that, in general, the classes or grades are very nearly the same in the different states as well as in Canada. In regard to the descriptions of these grades, the laws also appear very similar. For instance, in the Maine law, we find the following: "Fancy apples shall consist of apples of one variety, above the average size and color for the variety and none smaller than 2½ inches in diameter, sound and free from worm holes, bruises, scab or any other defect that materially injures the appearance or useful quality of the apples, and shall be properly packed in strong, clean packages."

The laws of the New York State specify a fancy grade as follows: "It shall consist of apples of one variety which are well-grown specimens, which are properly packed, of good color for the variety, normal shape, free from dirt, disease, insects and fungus injury, bruises and other defects except such as are necessarily caused in the operation of packing."

The United States law says: "Fancies shall be of one variety which are well-grown specimens, hand-picked, of good color for the variety, normal shape, practically free from insects and fungus injuries, bruises and other defects except such as are necessarily caused in the

operation of packing; or apples of one variety which are not more than 10% below the foregoing specifications, shall be standard grade, minimum size, 2½ inches, if the minimum size of the apple is 2½ inches in transverse diameter."

The Canadian Law says: "Fruit shall not be marked a fancy quality unless fruit consists of well-grown specimens of one variety, sound, uniform, and of at least normal size and of good color for the variety, of normal shape, free from worm holes, bruises, scabs and any other defect, and properly packed."

In the State of Oregon, where the most of our standard apple packs originated, we find in the regulations of one cooperative organization the following for fancy apples: "All apples must be clean, fully matured, of good color, free from any insect, fungus, rust, decay or injury except where specified. Deformed apples will not be accepted." Another western fruit distributing organization describes its Extra Fancy as follows: "The grade shall consist of sound, smooth, matured, clean, hand-packed, well-formed apples only; free from insects, diseases, blemishes, bruises, and other physical injuries, scald, scab, scale, sun scald, dry or bitter rot, worm, worm stings, worm holes, spray burns, limb rub, visible water core, skin punctures or skin broken at stem. All apples must be of good matured color, shape, and condition, characteristic of the variety." This organization handles the fruit of 42 local exchanges comprising over 7,000 growers.

In commenting upon these various grades as established by law, several points are noted. First: The regulations all refer to only closed packages, which

means packages sealed up so that the buyer cannot easily examine the contents. All packages not sealed would not need to conform in any way to these laws. Second: The State of Maine has the only law specifying sizes of apples according to the different grades. The other states specify that the minimum size shall be marked on the package and this minimum size shall not have less than 95% of the apples equal to or above the size mentioned. Third: That the United States law does not refer to anything except standard barrels. Apples packed in boxes or other packages need not conform to the United States law.

The grade of apples known as the unclassified, according to the New York and Maine laws, is hardly explainable because of its doubtful use. The only instances where it seems to be of value is in case the grower does not wish to pack according to any of the other standard grades. In enacting such a law, there was considerable opposition among the fruit growers and apparently the unclassified was put on to gratify such growers who did not care to pack or grade their fruit; because any size or any variety or mixtures thereof may be included in this unclassified grade, and all that is necessary to comply with the law will be to mark the packages "unclassified."

It is quite possible that these laws will be changed in the near future to conform more closely with the standard that the Western organizations have set. There apparently is no question among the more advanced growers and handlers of fruit that standard grades and packages are necessary, and they predict that in a few years there will be scarcely any demand for apples that

do not conform to some of these standard grades. The consuming public has reached the point where it does not care to spend money upon uncertainties. The cost of living is so high that what it now buys ought to be guaranteed, so that if not conforming to the standard, consumers will be able to get their money back. Most consumers do not object to paying high prices for goods that are perfect or up to the standard grade, but they do object to being buncoed by buying fruit or farm produce that is not in any way reliable.

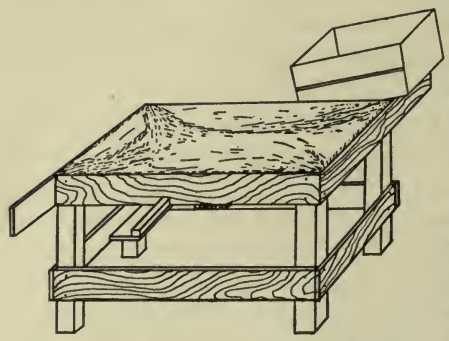


Fig. 21.—Packing or grading table, 4′ x 8′.

Sorting the Fruit.—Having determined what the standard grade shall be, the next step is to arrange the packing-house so as to best perform the operation of grading the fruit. In most of the packing-houses in the Eastern states what is known as a grading table is used. This is a table of the right height to suit the convenience of the individual doing the grading (Fig. 21). It is about 8 feet long and 4 feet wide and is covered on the top with heavy burlap. The apples are emptied upon this table and then picked into either boxes or baskets, depending upon whether the fruit is packed in barrels or standard apple boxes. This packing or grading table is arranged so as to have the best light possible. The room in

which the work is done is comfortable and clean. It should have a temperature of about 60 to 65 degrees. This is ample to enable the workers to be comfortable and at the same time will not materially hasten the ripening processes of the fruit.

Such a place may well be equipped with electric lights, so that when grading is done in the late evenings or on cloudy days there will be no chance for error because of inability to see blemishes or bruises. It has been determined by experience that the workmen will do much better work where all things are convenient and the room comfortable, than they will in close or

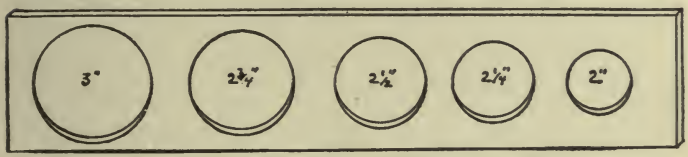


Fig. 22.—SIZING BOARD, 18″ x 4″ x ⅜″.

cramped quarters. It is not possible to do good grading or packing in dark, gloomy cellars or in open sheds or buildings where the environment is such as to make conditions uncomfortable.

The beginner will usually need some kind of a mechanical device for determining the sizes of the apples. A small board with holes, ranging from 2 to 3 inches in diameter, is often used. (Fig. 22). This is kept handy so the person grading can occasionally try an apple and thus familiarize himself with the different sizes. After a few hours work with this board, it can then be largely dispensed with. Where pains are taken, in picking the fruit from the trees, to dispose of badly deformed or

wormy specimens, all that is necessary in the grading house is to separate according to the requirements of fancies first and second grades. When a sorter becomes sufficiently expert at this work, he can grade and pack at the same time in either boxes or barrels, thus reducing the amount of handling necessary.

Mechanical Fruit Graders.—During the past five or six years, a number of mechanical fruit graders have appeared on the market. Most of these are designed for

Fig. 23.—GRADING FRUIT IN A WESTERN CANNERY
Peaches, plums, apricots, need to be carefully graded for size and ripeness before canning.

use in grading apples. However, some of them are also supposed to do good work on other fruits. The citrus growers of both California and Florida have used mechanical graders for 10 or 15 years, and have found them a very great help in cutting down the expense of the operation. They, however, do a large business, often sending out as high as 1,000 cars of fruit from a single packing-house.

All fruit that has to be wrapped and packed in boxes needs to be graded much more carefully than fruit that is shipped loose in packages; as, for example, apples shipped in barrels. Most of the mechanical graders for apples have appeared in the Central or Western states, but within the past three or four years, some of them have been tried out in the East. Many are still in the experimental stage and while they are being used more and more every year, it is still a question whether they

Fig. 24.—A GRADING MACHINE
This machine weighs and tosses the fruit to separate compartments.

are just the best thing to use. I am of the opinion, however, that in a few years more they will be perfected to such an extent that all large growers of apples will use them.

Irregular shaped fruit, like pears, or soft fruit, like peaches and plums, are seldom graded by mechanical means and it is not probable that such devices will ever be made successful. Fruit like strawberries or cherries which have long stems, do not lend themselves to mechanical appliances, hence they will probably always have to be graded by hand.

Most of the mechanical graders work on practically the same principle. They have a series of cups or openings into which the apples are fed from the hopper. As these cups advance they gradually increase in size until the apple contained in them falls through. The cups are the smallest at the intake. As the fruit advances, it falls through at different places, and is caught in receptacles or compartments according to the sizes

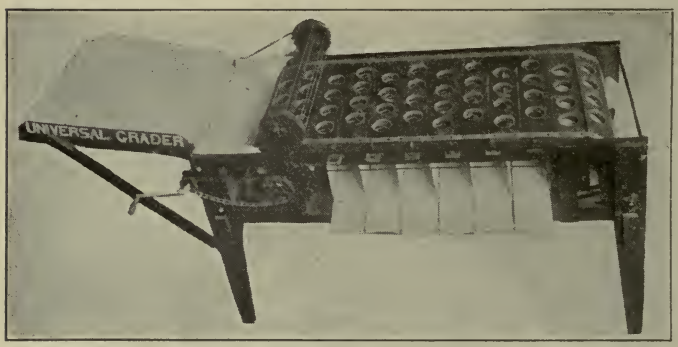


Fig. 25.—A MECHANICAL GRADER HAVING A MOVEABLE WEB

desired for packing. From these compartments it is packed into boxes or barrels as the case may be. There are several different types on the market, but these cups constitute the main principle. Some of them have long webs, and the cups pass around these webs like a belt. Others work in horizontal circles and still others are on a vertical wheel resembling somewhat the principle of the old-fashioned water-wheel.

In Figure 26 is shown a method of grading. The sizing is accomplished by 28 wooden flights mounted on

Fig. 26.—GRADING FRUIT

endless belts which move from the hopper over the entire length of the machine. Each flight consists of a board having four large, round holes drilled in it at equal intervals, beneath which is another board similar to the top board, except that part of the wood is cut away, forming a V notch, (which does not show in the illustration). This lower board acts as a "gate" to the openings in the

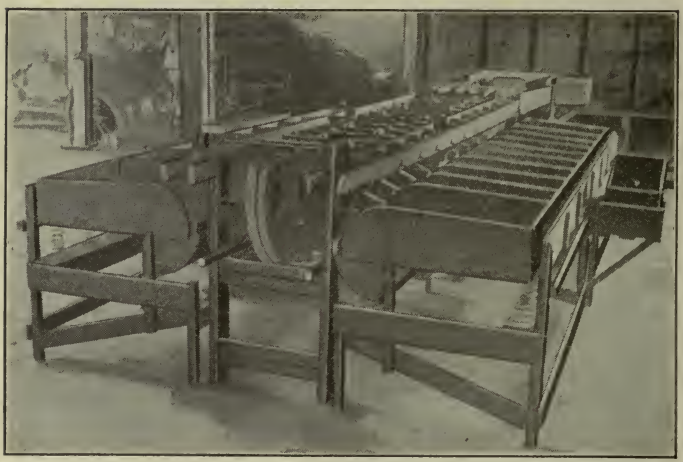


Fig. 27.—APPARATUS FOR GRADING FRUIT

upper board, except when the edges of the holes coincide. The "gate," board slides longitudinally with the top board and by sliding it various distances the openings may be increased at will. At intervals along the length of the machine are adjustable gauges, which regulate the size of the opening of each flight as it passes. The smallest fruit is dropped first and so on until the largest is deposited. Sizes from 1¾ to 3⅝ and larger.

The rapidity with which they work depends upon the size and the number of cups. The smaller machines, operated by one man, grade from 25 to 50 barrels a day. The larger machines run as high as 500 to 800 barrels a day, requiring three men to operate them. Most of them have a power attachment, necessitating a small motor or gasoline engine to run them. One and a half horsepower is sufficient for most of them. The cost of the machines ranges from $50 for the small ones, to $275 for the larger ones, not including the power to operate them. So far as experience has gone, the great objection to the graders is that they do not sort out the bad or deformed specimens. This means that at the feeding hopper someone must pick out the bad fruit, or culls, as they are fed through, or the fruit must later be graded from the compartments.

One particular brand of machine has a revolving brush in the hopper which is supposed to clean off any dust or dirt that may be on the fruit. This is always done with citrus fruit but is usually not required in grading apples. On the whole, mechanical graders are worthy of considerable study, and probably in the near future will be so perfected as to become a standard part of the equipment of large commercial orchards.

CHAPTER III

FRUIT PACKAGES

Packages *versus* Bulk.—The old system of selling fruit in bulk is no longer permissible. In some few instances it is still done, but in most fruit-growing sections it is prohibited by either custom or law. Not many years ago when the farmer went to the grocery store to buy his sugar or flour, it was dished out to him from a barrel which was always standing more or less open and not infrequently became a general collector of dust and dirt for a long time. This is no longer practiced and, indeed, ought not to be. Everything now is put up in small packages which are sold as a part of the contents. Occasionally, you will see dried apples, prunes, raisins, etc., on the market, sold in bulk, but for the most part this is dispensed with, and probably in a few more years none can be had, at least at retail, except in closed packages.

Gift Packages.—The tendency of the time is to use gift packages. These must be considered as a part of the cost of marketing the fruit and charges or calculations made to cover this cost. In some instances where growers cater to a private trade, the packages are collected and used over again, but where shipments are made the packages go with the fruit.

Requirements of Fruit Packages.—There are several considerations to be made in the selecting of a fruit

package. Custom has established some packages as standard, and laws have established others, but most of them ought to conform to some well-recognized standard. First, they must be cheap because, being a gift package, it is not good judgment to spend too much money upon the container of the fruit. Second, they must be light because freight rates are high on most of these packages and any unnecessary weight will only

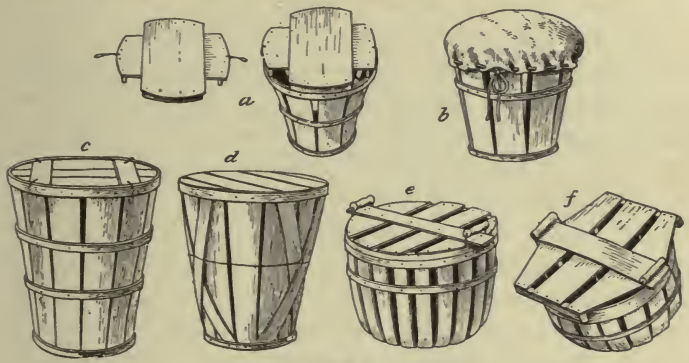


Fig. 28.—GIFT PACKAGES

a—14-quart peach basket, round covers; *b*—same, muslin covers; *c*—1-bushel hamper, plain; *d*—1-bushel hamper, braced; *e*—1-bushel peach basket; *f*—½-bushel peach basket.

add to the cost of shipping or handling. Third, they must be convenient not only from the packer's standpoint but from the shipper's and consumer's standpoint as well. They ought to be easy to load on wagons or on freight cars; they ought to be easy to handle on the retail market and also convenient for a purchaser to carry home or use in the home after once received. Some of the more perishable fruits are carried home by the consumer and placed immediately into refrigerators.

Hence, ungainly or unsightly packages could not be used.

All of these points must be considered and every possible step made to improve the convenience. Fourth, packages must be durable. While they are made as light as possible, they should not be so frail that many of them reach their destination in a smashed or broken condition. This ruins the fruit and, of course, reduces the sale price of the product. Fifth, and last, the packages must be sanitary. This is of growing importance at the present time and is justly so considered. As the amount of fruit consumed in large cities grows greater each year, more consideration must be given to have this reach the buyer in a sanitary condition.

The ideal package then, is clean, and neither old nor soiled in any way, is not ornamented or decorated with colored cloth or paints that might poison the fruit, and every possible precaution is taken to get wholesome fruit to the consumer. Much can be said in regard to the handling of fruit and vegetables in the large cities. Hucksters, push-carts, fruit stands and delivery wagons are frequently not of the best sanitary type and the consumer needs to be warned or the condition alleviated by legislation.

The Kinds of Packages.—The size and kinds of packages vary greatly in different sections of the country and so far little effort has been made toward standardizing the sizes of packs in the different states and in many cases, different parts of the same state. Apples are usually shipped in barrels or boxes. Barrels are the oldest, have been used the longest, and are most used in the Eastern states. Barrels have been discarded in

the Western states, and now practically no apples are shipped in barrels from west of the Mississippi. Boxes have been found to be more convenient for the western trade, and are cheaper and easier to handle. It is predicted that in a few years barrels will be displaced altogether by the standard apple box. All the citrus fruit from both the South and West is shipped in boxes. Pears and quinces are shipped in both boxes and bar-

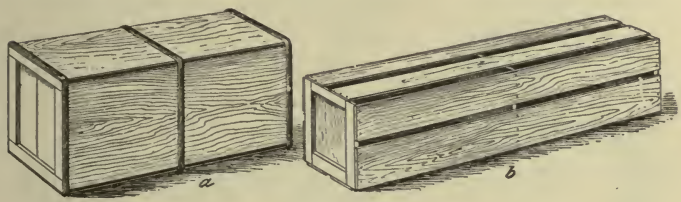


Fig. 29.
a—Standard orange box, 12 x 12 x 27 ins.; *b*—Pineapple crate, 12 x 10½ x 36 ins.

rels, depending upon whether grown in the East or West, the West using, for the most part, the standard box.

For the more perishable fruits like peaches, plums, apricots, etc., baskets of some kind are used. These baskets are of widely varied types. Most of them, however, are splint baskets made of hard wood, and the smaller ones are crated in some kind of a box container for ease in transportation. The Western people prefer the small two- or four-quart baskets shipped in box containers. Many of the Central and Eastern states ship direct to market in baskets of one-sixth, one-half or one bushel measure. Small fruit, with the exception of cranberries, is almost invariably shipped in quart or

pint boxes. These boxes are various in type and make, and are shipped in various sized containers. The containers range from 8, 16, 24, 32 to even 64-quart sizes.

Cranberries being a very hard fruit, are almost always shipped in boxes or barrels. Grapes, for the most part, are packed in small splint baskets or individual baskets. Those used in the West carry six pounds net and are crated in four box carriers. The individual baskets from the Central or Eastern states are quite popular

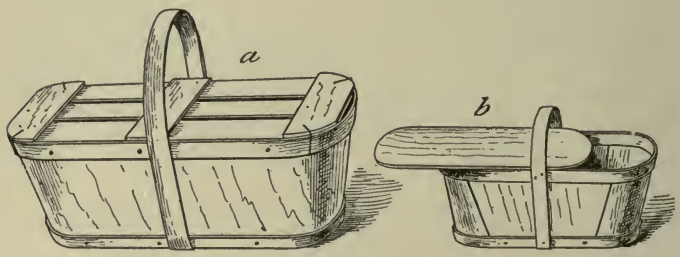


Fig. 30.
a—20-pound grape basket; *b*—8-pound grape basket.

and make a neat package for the consumer to carry home. For the larger grape industries in wine-making or grape juice factories, they are usually shipped by the carload either in 32-quart hampers or in 50-pound lug boxes. These hampers or boxes are usually returned to the grower for use over again.

Standard Sizes for Fruit Packages.—Most of the states have adopted standards in weights and measures for the various kinds of fruits, but only two or three have passed laws regulating the size of the packages for fruits such as apples, pears, peaches, etc. Most of the present fruit packages are the result of various tests

and trials from different shipping localities. Those that have been found efficient on the general market, have survived, while those that have not, disappeared.

Out of these almost innumerable kinds and types of packages have come two or three which are now recognised in most states as standard. Especially is this true for the larger fruits such as the apple and the

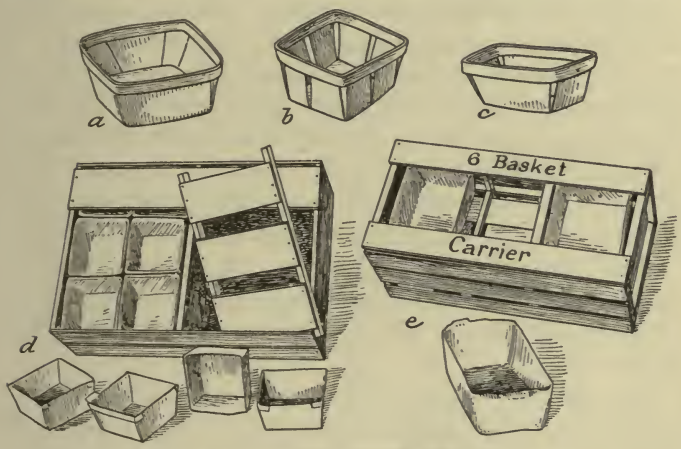


Fig. 31.—BASKET CONTAINERS

a—Standard square quart berry basket; *b*—Standard square pint berry basket; *c*—Standard oblong pint berry basket; *d*—Paper boxes; *e*—6-pound peach baskets.

pear. Regarding apple packages, the Western states have taken the lead in the adoption of a standard box, but, up to date, have not enacted laws to enforce their use. The different fruit-growing organizations have largely adopted these standardized packs and no regulative law from the state has been necessary to enforce their use. The United States has recently passed a law

defining what a standard apple barrel shall be, but they have not gone far enough to include in their law a standard apple box. Laws and customs of the various states so far as standard packages for apples are concerned, are very similar. These laws are summarized for the information of the reader.

Regarding the standard sizes of apple barrels, the Maine law requires the length of staves to be 28½ inches, the diameter head 17⅛ inches, the distance between heads 26 inches, the circumference at bulge 64 inches, and the capacity 7,000 cubic inches. The New York law is the same. By the Missouri law the length of the staves is 28½ inches, the diameter head 17¼ inches, the center diameter 20½ inches, and the chines ¾ inches. The Canada law states that the distance between heads shall be 26¼ inches, the diameter head 17 inches, the inside diameter 18½ inches, and the capacity 96 quarts. The United States law is the same as the Maine law.

By the Maine law apple boxes shall be 10½ x 11½ x 18 inches inside measurement, and have a capacity of 2,350 cubic inches. The New York law is the same. Canada requires the boxes to be 10 x 11 x 20 inches inside measurement, while the Pacific Coast associations have 10½ x 11½ x 18 inches inside measurement as a standard, and 10 x 11 x 20 inches as a special size.

It will be noted from the foregoing figures that Missouri is the only state that has a law on standard apple barrels which differs in any particular from the United States law. This was originally made to conform to the dimensions of the common flour barrel and does not differ sufficiently in any of its dimensions but what its

use is permissible in Maine or in New York. In fact, it is quite common to see apples shipped in either of these states in flour barrels.

The laws of the state of Maine read: "The standard apple barrel shall contain 7,000 cubic inches, provided, however, that the dimensions as given above shall constitute a legal barrel." It so happens that this legal barrel does not usually contain the 7,000 cubic inches any nearer than does the common flour barrel, as either one will pass readily as a standard apple measure.

In regard to apple boxes, only two sizes have been recognized in the United States. The standard apple box which corresponds with the dimensions required by the laws of the States of New York and Maine, and the special box which is the one required by the laws of Canada.

Western people have been using this Canadian box for a number of years and it has become known in that country as the "special apple box." Hence, the confusion of terms we sometimes hear: The box that is standard in the United States is a special box in Canada and our special box is the standard Canadian one. Occasionally we find half boxes in use, but these are almost always marked in terms of a standard box and they are well understood by the general trade.

Package Material.—A number of different woods are used in making apple barrels. In most cases the staves are made of pine or spruce or some of the other soft woods. They are cut by machinery and have to be shaped afterwards. Some of the material that goes into the more fancy barrels is planed, but the more common apple barrel is left in the rough as it comes from the

machine. There are five different kinds of hoops used on the common apple barrel: The sawed hoop, the shaved hop, the split hoop, the iron hoop and the wire hoop. All of these are used more or less satisfactorily, but either the iron or the sawed one is recommended as making the strongest and best appearing barrel.

Standard boxes are almost always made of some kind of pine or spruce, occasionally linden or cottonwood boxes are seen, but these are not generally satisfactory.

Fig. 32.—VARIOUS TYPES OF FRUIT PACKAGES MADE FROM VENEER

On the Pacific Coast, a good many boxes are made out of red wood, especially for the fruit that is packed for the cheaper trade. Box material, as a rule, is cheaper, easier to handle, and for equal bulk compares very favorably with the cost of the apple barrel.

Small fruits like berries are almost always in packages made from hard wood. The small splint baskets are usually cut from veneer. Practically all of the quart or pint baskets and many of the larger splint baskets are made of this veneer (Fig. 32), which is cut

from hard wood. Pine or soft wood does not easily work up into veneer. Most of these small baskets are put in larger containers or crates, and very often these containers are constructed of veneer wood. These are not the best kind of containers, however, because they soon warp and get out of shape and can seldom be repaired. Those containers made of substantial soft pieces are usually considered the best.

Fig. 33.—A FORM FOR SETTING UP APPLE BOXES

End pieces on left. Sides on right. Bottoms and cleats on rack in center.

Handling of Package Material.—There has been in the past considerable worry over the best

Fig. 34.—MAKING APPLE BOXES

means of handling barrels and boxes. Almost all of the standard boxes are now shipped in the shook and set up on the farm or in the packing-house where used. When contracting for shooks for boxes the specifications must be made specifically and uniformity insisted upon. The dimensions for the pieces of a standard box are as follows: Ends, $\frac{3}{4} \times 10\frac{1}{2} \times 11\frac{1}{2}$ inches in one piece; sides, $\frac{3}{8} \times 10\frac{1}{2} \times 19\frac{1}{2}$ inches in one piece; top and bottom, $\frac{1}{4} \times$

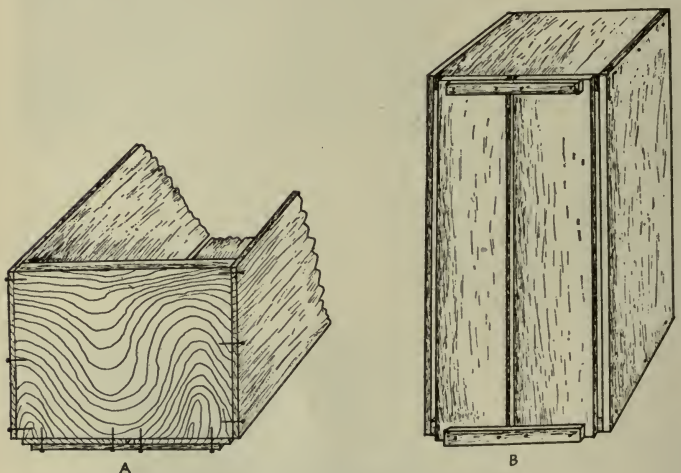


Fig. 35.—STANDARD APPLE BOX CONSTRUCTION

a—End view. Method of nailing; *b*—bottom or top. Method of spacing.

$5 \times 19\frac{1}{2}$ inches in two pieces, and cleats, $\frac{1}{2} \times \frac{5}{8} \times 10$ inches in two pieces.

The top and bottom pieces may be made in three pieces instead of two, if desired. It is necessary to have these pieces thin, so they will spring over the bulge and not injure the fruit. In setting up the boxes the only precaution is to have the top and bottom pieces equally

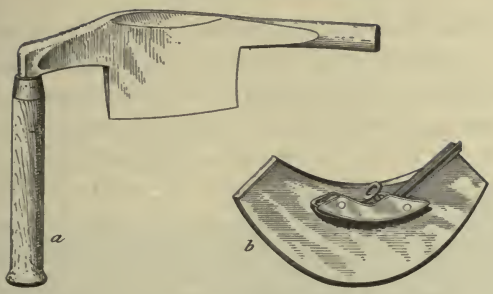


Fig. 36.—TOOLS FOR BARREL MAKING.
a—Chamfer knife for cutting the bevels on barrel staves; *b*—Crozer for cutting grooves in the staves for the head.

spaced, and allow for spring inside of the side pieces. (Fig. 35.) The nails used are four-penny, cement-coated, wire ones.

A great many of the barrels are still set up in the factory and shipped or hauled to the place where used. A grower can easily set up the apple box, but it requires some outlay or expense for equipping a shop to set up a standard barrel. This has led to the establishing of a great number of cooper shops all through the apple-growing sections. Barrel material is becoming more scarce each year and it is getting difficult to get a decent apple barrel without paying almost prohibitory prices. A small outfit that can be used on the farm to set up barrels will cost about $25 or $30. One

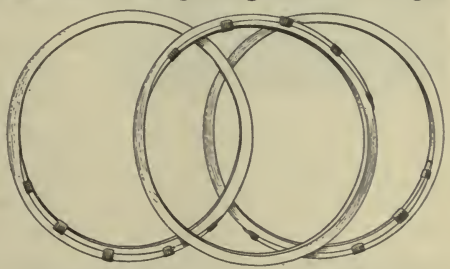


Fig. 37.—A SET OF TRUSS HOOPS USED IN SETTING UP A BARREL

will need to have a special heater to use in bending the staves. Certain companies are manufacturing these small outfits for about $25 for a complete set.

It is not at all difficult to properly make a barrel if the tools (Figs. 36 and 37) necessary are had, and the saving in the cost of material over the barrel already set up will be from 10 to 14 cents a barrel. A good barrel in the Eastern states costs from 30 to 40 cents. The materials for making such a barrel will cost from 20 to 30. Whether the individual fruit grower can afford to set up his own barrels will depend largely upon his ability to arrange the time and labor problems.

Fig. 38.—FORM FOR SETTING UP A BARREL

The lower chine and quarter truss hoops in position.

A barrel ought not to be set up very long before being used. They ought not to be made in the winter time and then held over until the next fall unless carefully stored to prevent weathering or discoloring. This would mean that the barrels are to be made at a time when

weather conditions are unfit for outdoor work just preceding the harvesting period. Whether or not a grower is to make his own apple barrels will depend upon local conditions. If the barrels have to be shipped by railroad, they consume a great deal of space and the

Fig. 39.—WINDLASS AND ROPE
For tightening up the staves to receive the chine truss-hoop. This is done after the heating so the staves will bend.

freight rates are almost excessive, while if shipped in the staves they occupy much smaller space and are much more easily handled.

In setting up the standard apple barrel, the staves are first put into a form (Fig. 38) supporting the truss hoops—a wide one and then a narrow one. When the form is complete they are then tightened up by the windlass (Fig. 39) and placed over the heater. When they are sufficiently heated to allow them to bend, they are tight-

ened up until the other truss hoop will go on. The barrel is taken out of the form, the hoops measured (Fig. 40) and nailed (Fig. 41) and pushed down over the truss

Fig. 40.
Measuring for size of hoop.

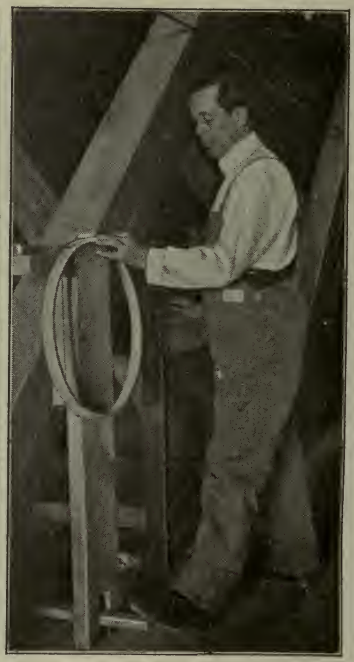


Fig. 41.
Special vise with foot-lever for nailing hoops.

hoop (Fig. 42). The two-quarter hoops are put on first; then the chine hoops. When the second chine hoop is in place the head is put in (Fig. 43) and the first chine hoop put on. It requires from 10 to 20 minutes for an expert to put up a barrel.

Special Packing Material.—Most all of the standard fruit packages call for certain other accessories which it is advisable to use with them. For example, in the

Fig. 42.

The quarter hoop is pushed down over the chine truss-hoop and tightened.

Fig. 43.

Placing the head, with quarter hoop in position.

barrel there are paper liners that are put around the inside of the barrel, and corrugated caps to put on the ends. The latter are supposed to keep the fruit from bruising. Then, on top of these caps are sometimes

used lace circles which add to the attractiveness of the barrel when exposed for sale. There are also a number of so-called winter cushions or basket cushions. These go upon the top of the barrel or basket to prevent the fruit from getting crushed and, to some extent, protect against winter injury. These cushions are little used and their expense for other than the most fancy fruit would make them prohibitive.

For box packing, there are the box liners, the layer boards which are pasteboard pieces to go between the layers of apples when no wraps are used, and the tissue wraps which cover the apples. The tissue wraps are of two or three different grades, but the light tissue is usually put on fruit that has no stems, while the heavy tissue is used on apples and pears, where there is danger of the stem penetrating the paper.

CHAPTER IV

FRUIT-PACKING OPERATIONS

Packing Apples in Barrels.—The operation of packing apples in barrels is not a difficult one if everything is arranged for convenience in doing the work. Two or three barrels are provided within easy reach of the packing table. These are to accommodate the different grades or sizes of fruit. If many of the apples are bad, the lot is gone over previous to the packing and the culls thrown out. It is customary to do the sizing during the process of packing, but it ought not to be necessary for the packer to look for worm holes, bruises, etc. This should be done beforehand.

Preparing the Barrel.—As the barrels come from the cooper shop, both ends are headed up. One end is selected for the face of the barrel and the other head removed. The first operation is to nail in the head. This is done by nailing through the first hoop into each piece of the head (Fig. 44). Where there are more than two pieces, six to eight nails will be necessary to hold them properly. The two-quarter hoops are next securely nailed (Fig. 45). If the barrels are intended for foreign shipment these are given considerable attention. The shipping of fruit long distances has the tendency to spread the barrel, and if the hoops slip or expand, the fruit arrives at its destination in a "slack pack."

On the foreign market considerable fault has been found with these "slacks." The fruit becomes bruised in transit and from 25 to 75 cents is deducted from each barrel because of this condition. The quarter hoops are driven down tightly and then securely nailed with three-penny wire nails, using two or three to the hoop, being

Fig. 44.
Nailing in the head of the barrel before packing.

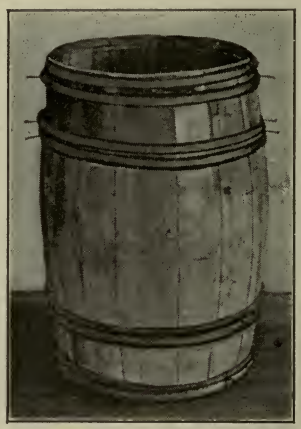


Fig. 45.
Nailing the quarter hoops. The chine hoops are not nailed until head is in place.

careful to have them thoroughly clinched inside. In nailing in the head, four-penny box nails are considered the best.

Before putting any fruit in the barrel the corrugated caps, lace circles or barrel liners are put in place if they are intended to be used. The corrugated or roughened part of the cap is put down on the wood and then

the lace circle on top of this. It is well to use some kind of paper to keep the fruit from coming in direct contact with the wood, but the use of the fancy lace circle or more expensive cap is not customary except for the very finest grades. Sometimes customers request the use of these special packing materials, and in such cases they should always be used.

Facing the Head.—This is an important operation and is accomplished with considerable care. The packer will learn how many apples will be required of any given size to make one layer over the end of the barrel. He selects sufficient of these from the grading table, being careful to get uniform specimens both in size and color. They are put into a swing-handled basket and emptied into the bottom of the barrel. The packer then reaches in and arranges these apples in a circle around the bottom, placing the stems down. If the stems are so long that the apple rides over them, they are cut off by a special stemming tool. This resembles a small plier and can be purchased from orchard supply houses.

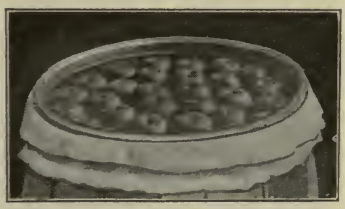


Fig. 46.
A well-faced barrel.

There is considerable diversity in methods of facing barrels throughout the various fruit-growing sections, but most of the growers prefer to face two rows, the second row resting on the interspaces between the first. This gives a better appearance when the barrel is opened for inspection. Of course, it is understood that the end

of the barrel that is filled first becomes the top of the barrel when the fruit is opened on the market.

Filling In.—After the facing has been completed the apples are then gently poured in from the grading table by using the swing-handled basket (Fig. 47 *a*). Every precaution is taken that in this "filling in" process the same shape, size and color of apples are used all through the barrel as are used in the facing. The only legitimate difference being, that for facing apples more

a *b* *c* *d*

Fig. 47.—TOOLS FOR BARREL PACKING
a—Filling in basket; *b*—hoop tightener; *c*—sizing board; *d*—follower.

attention may be paid to getting specimens of the same color. Apples that run uniform in size and color all the way through the barrel will easily bring 25 to 35% more than a mixture. The sizing can be done during the packing process if there are two or three barrels standing convenient that can be filled at the same time.

Racking the Barrel.—As the process of filling continues the barrel is gently racked back and forth to settle the apples down as closely together as possible. The barrel is set on a plank which is about 2 inches less

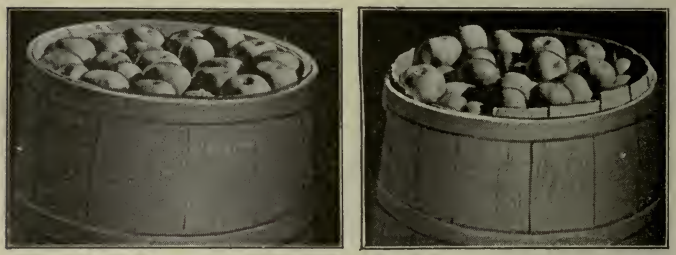
in width than the diameter of the barrel, and the racking done on this plank. It ought not to be too violent because of danger in bruising the fruit. About three rackings during the filling-in operation is sufficient.

Use of the Follower.—This tool is a round piece of wood just the size of the head of the barrel, lined with felt on one side and a hand hold on the other (Fig. 47 *d*). At the last racking operation this follower is placed on top and held down firmly while the apples are being settled. This evens up the top of the barrel and makes it easier for the next process. Each packer is provided with one of these followers.

Fig. 48.
A slack barrel from insufficient racking.

The Tailing Process.—This is the arranging of the fruit on the filled barrel so as to get an even bearing for the head. When the last racking is done the top layer of apples should come from 2 to 3 inches from the top of the barrel. The balance of this space is then filled in by hand, arranging the fruit with the stems up as near as possible in the same manner as the facing. The tailing process is the hardest part of the entire packing operation. The apples ought to be even on top so that when the head is put in, pressure will be applied equally on all of the specimens.

Just how high the top layer should be is a matter to be determined by experience, judging from the variety of the apple. Soft apples will give more than hard ones without hurting. If the apples project just about even with the top of the barrel, they will be approximately correct and then when the head is put on they will be pressed down the thickness of the head, plus the thickness of the chine of the barrel. If too much



a—Properly tailed. *b*—Careless work.

Fig. 49.

pressure is applied the apples will be bruised and the two top layers will be practically ruined for commercial purposes.

Heading the Barrel.—After the fruit is placed on top the best that can be done, the corrugated cap is put on, if used, and then the barrel head laid on top. This is gently forced into position by a barrel press until it rests in the crozes and then the hoops are driven in place.

Nailing.—After the head has been put on it is nailed fast through the first hoop in the same manner as the face of the barrel was at the beginning.

Heading Presses.—There are several different makes of barrel headers on the market, most of them working satisfactorily. Some of them exert pressure by means of a screw while others use a lever. The ones that have the circle (Fig. 50 *b*) which exerts the pressure on the head is better than the long, flat piece, because of the even distribution of pressure over the end of the barrel. Where the flat press heads are used they often slip sideways and, in the hands of careless packers, do considerable damage to the fruit.

a *b*

Fig. 50.—TWO TYPES OF BARREL PRESSES
b is preferable, as it exerts a more even pressure on the barrel head.

Packing Fruit in Boxes.—It requires much more skill and practice to put up a successful box pack than it does with barrels. The apples must be graded to a more uniform size and more care taken in every way. Boxes are placed on the side of the packing table (Fig. 52), giving the right height to meet the convenience of the worker. These boxes can be put on either end of the grading table to suit the packer, depending on whether he prefers to use the right hand or the left in placing the fruit.

Each box is fitted with two box-lining papers. These

are cut to fit the length of the box and lap about two-thirds of the way on the top and the same on the bottom. In placing these papers in position an extra crease needs to be put in to the bottom to allow for the spring when the lid is put on (Fig. 53). If this pleat or fold is not present, the spring of the bottom will tear the paper. Occasionally box liners fitting over the end as well as the sides will be found, but these are seldom used and are not at all necessary.

Fig. 51.
Barrel lever press.

If the apples are to be wrapped in tissue no other package material is used. If they are not to be wrapped, the so-called layer boards are used between each layer of apples. These keep the fruit in place and add to the attractiveness and appearance of the pack. It is customary in most fruit sections to use the wraps in preference to the layer boards. Where wraps are used there is not much difference in the cost of materials and very little difference in the time required to properly pack a box. Without doubt those in tissue wraps will carry farther and "stand up" better for a much longer time. Besides the tissues serve as a cushion to prevent bruising in handling.

There being only two sizes of boxes used for apples,

it is sometimes difficult to pack all the different shapes and sizes of apples in these boxes. Therefore, considerable time and practice is necessary before a packer becomes efficient. In the larger orchard sections of the West packing schools are held where experts may be trained to do this work. In fact, where cooperative

Fig. 52.—PACKING TABLE
Boxes in position.

organizations are in vogue, growers are not allowed to pack their own fruit but the work is done under the direction of the organization by a corps of experienced or licensed packers. On the side of the box is placed a little arrangement known as a "paper hod" to hold the tissue for convenience in the wrapping process.

Terms Used in Box Packing.—Before one can successfully understand the operation of packing apples in boxes, there are several terms with which he must be-

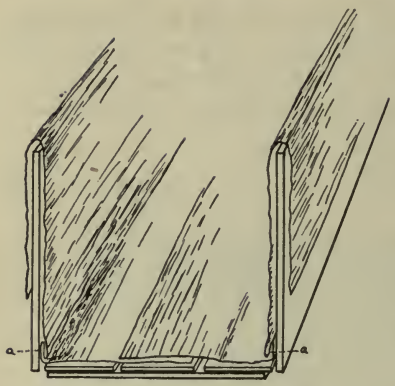


Fig. 53.
a-a—Correct folds in box liners.

come familiar. The first one of these is the *style of pack*. The sizes and shapes of apples vary so greatly that to accommodate them to the same size box, several different methods of placing them have been devised which are designated as packs or style of packs. These are known respectively as the straight, offset and diagonal. (As shown in Fig. 56.)

In the straight pack, every apple is directly above or at the side of each other apple. Lines run straight, lengthways, crossways, and up and down in the box. The straight pack is very popular when the apples are

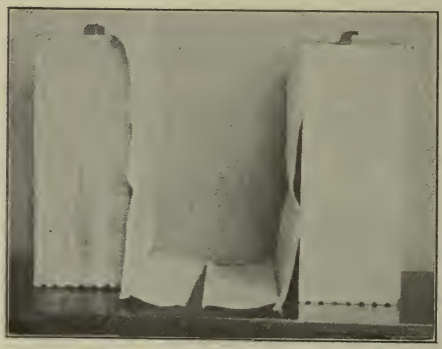


Fig. 54.—INCORRECT FOLDS IN BOX LINERS

of the right size, but only certain standard sizes lend themselves to this method. In the off-set pack, the apples are laid in the interspaces of the preceding layer, requiring a half apple to complete the rows crossways and lengthwise of the box. In the diagonal pack, the apples do not run in straight lines across the box, but diagonally. This pack is most used and lends itself to far greater varieties and types of apple than either of the others.

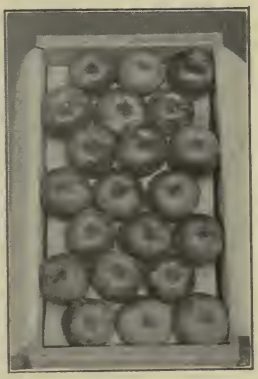


Fig. 54*a*.
Box pack where layer-boards are used instead of wraps.

The number of apples required to reach across the box is known as *tiers* (Fig. 57 *a*). These vary from 2½, 3, 3½, and up to 6 tiers in a box. The number of apples required to cover the bottom of the box would be known as a *layer* (Fig.

Fig. 55.—SCHOOL FOR INSTRUCTING ORCHARD MEN IN FRUIT-PACKING

57 *b*). If four apples would reach to the top of the box, we would then have a four "layer pack." The *count* is usually placed on the outside of the box, and means the number of apples in the package. This is required by most organizations and enables the purchaser to know how many apples there are in the package.

In order to get these counts it is necessary to keep in mind the number of apples in the length of the box

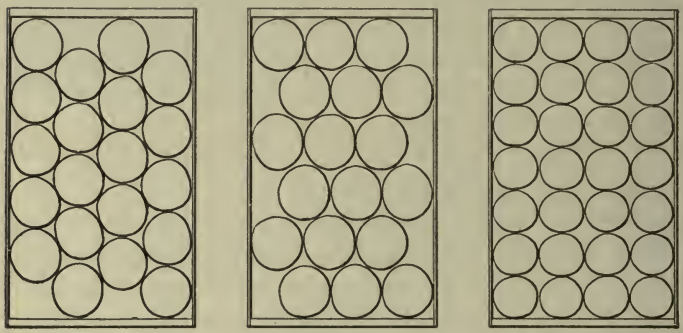


Fig. 56.—STYLE OF PACKS

Diagonal pack is most used. The others are gradually going out of use.

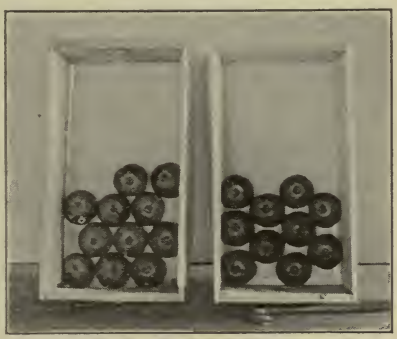
as well as in the width, and since these vary in the different styles of packs, they are usually designated by two figures. In starting a diagonal pack, two apples could be placed at the end of the box and then two following on the spaces between these. This would be known as a "two-two" pack in width (Fig. 58 *b*). The same arrangement is followed regarding the number of apples in the length of the box.

In order to compute accurately and quickly the number of apples in each layer, it is necessary to know the

a—One tier. *b*—One layer.

Fig. 57.

number of apples in the length of these rows. Most places where box packs are used a table for calculating the number of fruit in a box has been worked out. The one following is typical of most of these tables. Altogether, for both the standard and special box, there are 60 different arrangements of packs. The table given includes only about 25 of the more common. New arrangements can be



a *b*

Fig. 58.

a—3-3 Offset pack. *b*—2-2 Diagonal pack.

worked out from a study of those that are here given.

STANDARD BOX PACK

Tier	Style	Layers	Apples per row length	Apples width of pack	No. apples per box	Approx. size apples in inches
3	Straight	3	5 — 5	3	45	3½ x 3½
3	"	3	6 — 6	3	54	3½ x 3
4	"	4	6 — 6	4	96	2¾ x 3
4	"	4	7 — 7	4	112	2¾ x 2½
4	"	4	8 — 8	4	128	2¾ x 2¼
5	"	5	8 — 8	5	200	2½ x 2
3½	Offset	4	3 — 4	3 — 3	84	3¼ x 3
3½	"	4	4 — 4	3 — 3	96	3¼ x 2¾
4½	"	4	4 — 5	4 — 4	146	2½ x 3
4½	"	4	5 — 5	4 — 4	160	2½ x 2¾
3½	Diagonal	4	4 — 4	2 — 2	64	
3½	"	4	4 — 5	2 — 2	72	
3½	"	4	5 — 5	2 — 2	80	
3½	"	4	5 — 6	2 — 2	88	
4½	"	5	6 — 6	3 — 2	150	
4½	"	5	6 — 7	3 — 2	163	
4½	"	5	7 — 7	3 — 2	175	

SPECIAL BOX PACK

3	Straight	3	7 — 7	3	63
4	"	4	8 — 8	4	128
4	"	4	9 — 9	4	144
5	"	5	10 —10	5	250
3½	Diagonal	4	6 — 6	2 — 2	96
3½	"	4	6 — 7	2 — 2	104
3½	"	4	7 — 7	2 — 2	112
3½	"	4	7 — 8	2 — 2	120
4½	"	5	7 — 8	3 — 2	188
4½	"	5	8 — 8	3 — 2	200

Filling the Box.—When everything is properly arranged for work, the packer places the box on the rack, puts the paper hod on the side, the liners in place, and then begins the process of wrapping and filling in. For the beginner, this will require considerable attention and often a number of attempts before a desirable pack is worked out. Four or five apples of the average size may be placed in the box before wrapping and a study made of the arrangement which they are likely to best fit. After a little practice, it can be easily determined whether to take a diagonal, straight or an off-set pack.

For apples that are almost round or spherical, little attention will need to be paid to the way they are placed in the box, but for the most part, uniformity is required and if the pack is started with the apples on end this same relative position should be maintained throughout. In most places, what is called the "side pack" (Fig. 60), or as it is sometimes designated "cheek pack" is preferred. Apples are placed on their side with the stems projecting towards the side of the box rather than

Fig. 59.—END PACKS
Desirable for very flat apples.

towards the end. When one arrangement is selected for the pack, it should not be varied throughout the box, either in regard to the placing of the apples or their position on side or end.

Wrapping the Apples.—To do this best, the paper is taken in the left hand with the palm up. To facilitate the removing of the paper from the hod a rubber finger-stole is used. These can be purchased at most any drug store. The apple is picked up in the right hand, placed

in the left at about the center of the paper, then bringing both hands palm upward under the apple the thumbs are run around to the top and the apple is rolled, bringing the corners of the paper in over the top. As the apple is being wrapped, it is moved towards the box and by the time the wrapping is completed, the right hand places the apple where it belongs in the package.

In wrapping fruit that has long stems, the heavy

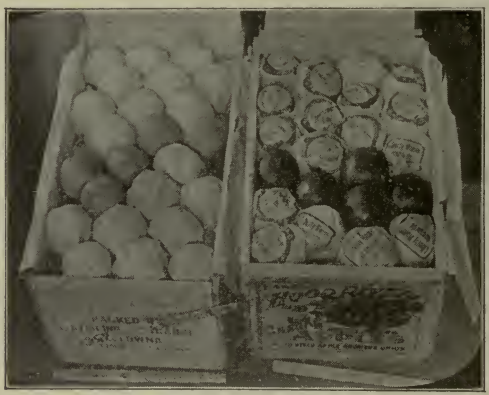


Fig. 60.—SIDE PACKS ARE USED IN THE WEST

tissue or Oregon wraps are best. The "wad" or heavy part is placed over the stem to prevent them from puncturing the paper (Fig. 66) and giving an unsightly appearance. A little practice in placing the apple in the proper position in the hand will soon enable the packer to get the "wad" in the right place.

Requirements of a Good Pack.—Every box is made to conform with certain well-understood requirements. Outside of the condition of the fruit itself, certain things

Fig. 61.

Holding the paper in the left hand, palm up, place the apple near center.

Fig. 62.

Slide the left thumb up, bringing the paper up over the apple.

Fig. 63.

With both hands, palms together, slide the first fingers up under the apple.

Fig. 64.

Slide the thumbs up over the top, catching the corners under the left thumb.

Fig. 65.
Bring the right hand from under, up over the top.

are always looked for by the handler or buyer of the fruit. In the first place, the packing must be tight, so that the apples will not move or rattle about in handling. To accomplish this, what is generally known as the swell or bulge (Fig. 67) is put on each package. That is, in filling the box, the apples in the center are higher than those on the end. This is usually from a half to three-quarters of an inch higher in the center than the top of the box.

Fig. 66.—NOT PROPERLY WRAPPED
Stems should not puncture paper.

Fig. 67.—BULGE ON BOXED FRUIT
Left too high. Center about right. Right too low.

When the top is nailed on, the spring of the slats keeps the apples tight yet does not exert enough pressure to bruise the fruit.

Then by making use of the cleats on each end, the boxes can be piled or tiered up in storage or shipping and the bulge in the center will not be sufficient to cause the fruit to be bruised by the weight of the packages. This swell is made uniform across the box and diminishes gradually towards each end making a sort of a circle in outline. At the end, each apple projects above the box only about one-quarter of an inch. If more than

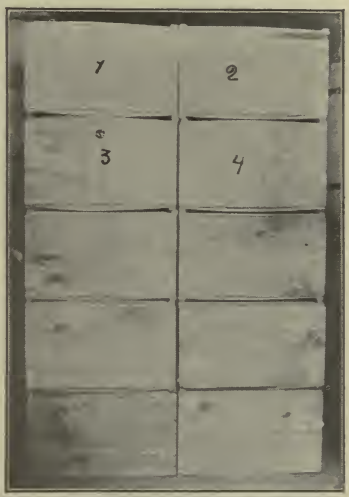


Fig. 68.
1 and 3 correct bulge. 2 and 4 slack. Closed packages should not be piled on the face, but always on the side.

Fig. 69.—GOOD ALIGNMENT—GOOD PACKS

this, the nailing of the tops will bruise the apples. The alignment of the rows should be straight, both lengthways and diagonally across the package (Fig. 69). This can be accomplished only by the use of uniform-sized apples. The papers are put on carefully and the "wad" placed over the stem, then in case the stem is strong enough to tear the paper, it will not show through in the pack.

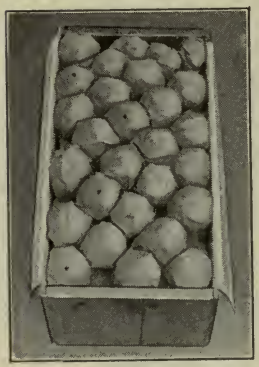


Fig. 70. BAD ALIGNMENT
Size not uniform, stems puncturing paper

Nailing Device.—Every packing shed where boxes are used will need to be equipped with a nailing press. This is an ar-

rangement for putting on the tops or covers of the boxes. There are a number of different types of presses on the market, but the essential principle of all of them is some kind of a lever arrangement which will catch the boxes on the ends and not exert any pressure on the fruit except what is required to spring the pieces of wood used for covers. If these catches can be worked automatically by the foot, they will be much more convenient because it leaves both hands free to fit the top and do the nailing. These presses can be made by any carpenter, or they can be purchased from package supply houses. Along with each press is used what is known as a "Nail Stripper" (Fig. 72). This is a device for holding the nails in a convenient way for nailing. Fine wires are so arranged that the nails are caught by the head and hang loose so the nailer can easily grasp them.

Fig. 71.—A HOME-MADE BOX NAILING PRESS

Rules in Packing.—Where cooperative organizations do the packing, the grower is not allowed to do anything but pick and grade the fruit. In some instances the fruit is picked by the owner and carried direct to the packing-house where experts grade and place the fruit in the

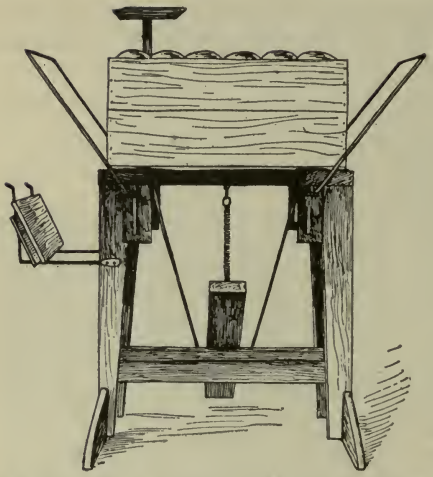


Fig. 71*a*.—BOX PRESS USED IN CANADA

package. In other cases, each grower has his own packing-house and the organization sends out a corps of packers to do the work for him. In such cases the grower is expected to provide all the boxes and wrapping material, to grade the fruit, and when everything is ready, he notifies the organization and they then arrange to pack the fruit.

A crew of packers consists of four men under the supervision of a foreman. They go to the packing-house of the grower and proceed to pack the fruit. Each packer is expected to place his own box in position, put in the liner and do the wrapping and filling in. He is not supposed to pay any attention to bruises or worms or anything that ought to have been

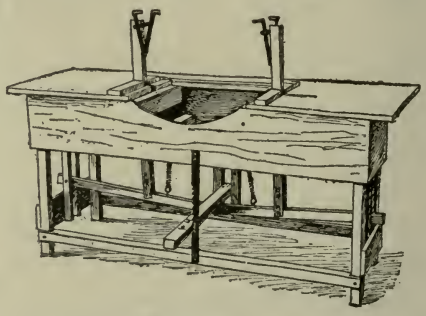


Fig. 71*b*.—WESTERN BOX PRESS

done in the previous grading. The sizing is done during the process of filling. The foreman keeps track of the packages, sees that the work is properly done, nails on the tops, and stencils on the end the number of apples in the box and the number or name of the grower.

In most cases, the packer himself, being licensed by the organization, has his number placed on the package, so if at any time a box is returned on account of poor

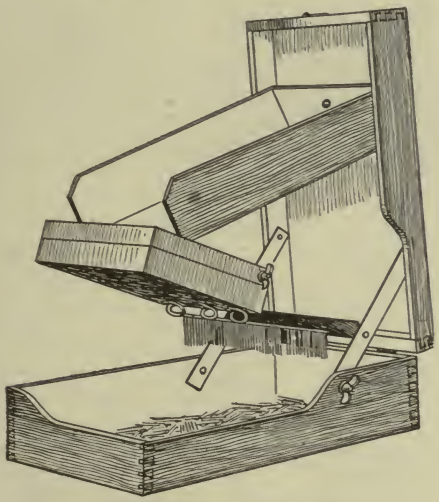


Fig. 72.—"NAIL STRIPPER"

work, the one who is responsible for the packing can be forced to correct it or pay for the damage. Each packer sets off his own box, and with a pencil places on the side the number of apples in the package. This allows the foreman to check them when he places the number on the outside with a rubber stencil. Where

Fig. 73.—EXPERT BOXERS AT WORK IN A WESTERN PACKING-HOUSE

the packing is done in a central packing-house, a little more elaborate system of keeping records is needed. This will be discussed under the general subject of co-operative organizations.

Cost of Packing Apples.—It is hard to get a very definite comparison of the cost of packing apples in boxes or in barrels, but the following figures will serve as a guide for the different operations: Making calculations on the basis of three boxes equal to one barrel, the relative costs would be about as follows: Barrels cost from 30 to 40 cents; the pasteboard caps about 75 cents a 100; circles about the same; and the filling and packing of the barrel varies from 10 to 25 cents, depending upon the variety. For apple boxes, the first cost runs from 10 to 15 cents, the setting up 1 to 2 cents each, box liners 15 cents a 100, layer boards 75 cents

a 100, wrapping paper 35 cents a 1,000, and the filling and nailing of the boxes about 5 to 7 cents each.

Or making comparison in another way, the cost of barrels runs from 30 to 40 cents; corrugated caps, 1¼ to 2 cents; lace circles, 1¼ to 2 cents; packing and heading, 10 to 25 cents or a total of 42½ to 69 cents a barrel. The cost of three boxes ranges from 33 to 48 cents; the making, from 1 to 2 cents; paper wraps, 10 to 14 cents; paper box liners, 1 cent; filling in fruit, 15 to 21 cents or a total of 60 to 86¼ cents for the barrel equivalent.

Fig. 74.—LITHOGRAPHED LABELS FOR BOXES AND BARRELS

Labeling the Fruit Package.—After the fruit has been properly placed in the package and sealed up, it

must be labeled to conform either to the customs of the markets or to the requirements of the laws of the different states. Some states are very explicit about the labeling, while others have no law governing the subject at all. In the State of Maine, the requirements would be about as follows:

Fig. 75.—MACHINE FOR MARKING FRUIT PACKAGES

It prints all the information at one stroke.

"There shall be affixed in a conspicuous place on the outside of the package a plainly printed statement clearly stating the size of the package in terms of standard bushel box or standard barrel; the name and address of the owner or shipper of the apples at the time of picking; the name of the variety; the class or grade of the apples contained therein, and if grown in Maine, that fact shall be plainly stated." This law undoubtedly was the result of an effort to advertise certain grades of Maine grown apples. It was discovered that certain shippers were buying apples of other states and selling them as Maine grown apples, the reason given being that certain varieties colored up better and developed better flavor in the northern section of the country than they did farther south.

The United States law and that of New York state practically agree in their requirements for branding packages. They do not specify the size of the apple but

do require that the package be so labeled as to indicate the minimum size. Apples that average 2½ inches in diameter or above, should be labeled "Standard grade, minimum size, 2½ inches," and this would mean that at least 95% of the apples contained in the package shall be 2½ inches or more in transverse diameter.

Fig. 76.—PACKING SWEET CHERRIES IN CALIFORNIA

Nearly all of the Western fruit-growing organizations have a registered "trade-mark" or "brand" and each grower is instructed to use these standard marks. In some sections, the grower's name and address is put on each package. In other places the growers have numbers which are put on each package for identification purposes in case the work is not up to standard.

For the purpose of getting this information on the

outside of the package, two methods are used: one is the so-called stencil and the other a lithographed label. The stencils are cut from pieces of tin or copper and the label is painted on through the letters cut in the stencil. In the case of the lithographed labels, a large colored picture representing a trade-mark or brand is made from standard cuts, then the information about the size and grade is put on this paper with a rubber stamp.

There is no question among most of the progressive fruit growers but what the lithographs are the best. They will answer to a number of different varieties of fruit and are much more attractive and also serve a better purpose in advertising a brand or grade of fruit. These lithograph labels are made in sizes suitable for both barrels and boxes and can be variously printed to meet the needs or desires of the grower. In this way, the individual "'trade-marks" or special advertising matter can be used together with the other information required on the package.

CHAPTER V

FRUIT STORAGE

The question of storage of fruit has become of vastly more importance during the last decade than ever before, and each month sees some new advancement or development along fruit storage lines.

Objects of Storage.—There are four main reasons why fruit is stored:

(1) For family use.
(2) To ripen up before selling.
(3) To tide over periods of over-supply.
(4) To prolong the period of keeping.

The first is the oldest and longest in use and constitutes a very important part. However, it is pretty well worked out by each individual family and does not need to be further commented on here.

The "ripening-up" of the fruit before selling is an important consideration, because fruit thus ripened is often of better quality than when left on the trees. Certain varieties and kinds of fruit will keep only a few days while others can be kept, under proper conditions, for months. Often the degree of flavor or aroma developed in the fruit depends on the conditions under which it is ripened. Each different fruit has to be studied in this particular and treated in accordance with its specific demands.

The third consideration is of more importance than the others in so far as commercial fruit growing is concerned. The term "over-supply," as here used, refers not necessarily to the amount of fruit produced but to the quantity that is offered for consumption at any one time.

The terms "over-supply" and "over-production" are often used synonymously, but incorrectly so. There may be very much more fruit offered for sale than the people want at any one time and yet far from a real over-production. We may say, in fact, that over-production rarely, if ever, occurs, but over-supply is a very frequent market condition.

Most fruits ripen rapidly, and are grown over such a large area that it makes an enormous quantity that must be sold at one time. If all of this is rushed to the large markets, there will soon be offered for sale more fruit than can be consumed. If, on the other hand, some well-organized plan is in vogue by which the over-supply may be stored, then this can be spread over a much longer time and hence an over-supply avoided.

The prolonging of the period in which fruit can be kept in good condition adds to its commercial value. It gives the consumer a wider range to choose from, and allows the use of fresh fruit the year around. Many perishable fruits which normally would never reach the northern markets are now possible because of the lengthening of the keeping time by the use of cold storage.

Requirements of Fruit for Storage.—In order to store fruit to the best advantage, certain requirements are necessary: (1) Good fruit. (2) Proper handling. (3) A control of the temperature. (4) A proper humidity

in the storage room. Only fruit that is in a prime condition is worthy of being stored. It ought to be No. 1 or fancy in every respect, containing no bruises, worm holes or blemishes of any kind.

In making use of public storage, the fruit must be properly packed and sealed, so that when it is removed from storage, the packages will not need to be opened until they reach the consumer. It is necessary also to know the temperature, because no fruit will keep well unless the temperature remains even and does not fluctuate. In most cases a lower temperature than the surrounding outside conditions, is necessary. As the temperature runs down towards the freezing point, the ripening processes of the fruit is gradually slowed up, the decay organisms do not work as rapidly, and altogether, the length of life or keeping qualities of the fruit is greatly increased. The humidity refers to the amount of moisture in the air. This is measured in grains per cubic foot of space. When the air is saturated or contains all the moisture it will hold, it is designated as 100% humidity. Beyond this point, precipitations as rain or fog result.

Most fruits run high in water content, varying from 80 to 83 or 84%. If the humidity of the atmosphere in which the fruit is stored is more than 85%, the tendency is for the fruit to decay. Moisture will collect on the surface of the fruit in drops, and forms ideal conditions for the germinating of decay organisms. On the other hand, if there is less moisture in the atmosphere than in the fruit, there will be a general tendency for the fruit to dry out, and hence become shrivelled or lose weight. Fruit that drys out in transit, loses in size as

well as in weight. This is one of the factors which causes slack packs resulting in badly bruised or injured fruit.

Kinds of Fruit Storage.—The most common and the oldest means of storing fruit, was a cellar under a residence. This is permissible when storing for family use,

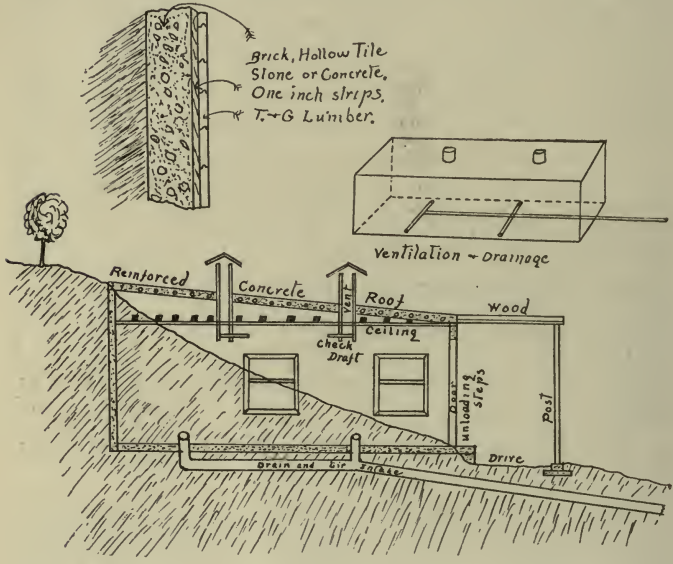


Fig. 77.—A SMALL FARM STORAGE CELLAR, OR "DUG-OUT"

but for commercial purposes, it needs to be discouraged. Most cellars in the Northern states are more or less damp, they are not well ventilated, temperature cannot be properly controlled, and as a result, the fruit does not keep well and, upon decaying, endangers the health of the occupants of the resident above. The more im-

portant storage for small farmers or fruit growers is what is usually designated as a "dug-out" (Fig. 77). This consists of a small cellar dug into the side of a sloping bank. It may be constructed simply as a cellar or as a basement under the packing-house previously mentioned.

Two principles must be kept in mind for this kind of a storage house. In the first place, it must be well in-

Fig. 78.—SMALL STORAGE AND PACKING-HOUSE
This is built from hollow tile. The outside finish is to be stucco.

sulated against the low temperatures during the cold winter weather. Secondly, it must be arranged for proper ventilation and for the purpose of keeping the room as cool as possible without freezing. A small cellar 18 x 24 feet will easily accommodate 200 to 250 barrels of apples. It can be constructed of stone or cement and lined with wood, leaving a "dead air space" inside in which is put some special insulating material;

or common building paper can be used between the boards to protect the cellar against freezing from outside.

It is best to make the windows double, and extra wooden blinds for the outside to put on when the temperature reaches zero or below. For controlling the ventilation in such a house, a pipe is brought up under the floor, reaching out 30 or 40 feet away from the house. It affords both drainage and an inlet for cold air. The air is brought in under the floor and coming up through, is easily distributed over the bottom. As it gets warm, it rises and is taken off through an outlet in the roof.

If no rooms are to be built above the cellar, cement can be used throughout. The outside walls can be made of stone, brick, hollow tile or concrete as desired. Twelve-inch walls would answer if the building was made of stone, while 6 to 8 inches thickness will only be required if other materials are used.

Particular attention must be given to drainage, Sumps can be made into the air pipes to allow the water to run off. If the soil is inclined to be wet, seepage through the walls must be looked out for. Moisture will collect on the inside walls and the humidity become too high. It is always best to cover the inside of the cement or stone with some waterproofing material. A number of such materials are now offered by the trade. Unless the soil is naturally very dry a cement floor is desirable. This is easy to keep clean, is durable, and will keep the packages free from dirt or soil marks.

The roof can be made of reinforced concrete 4 or 5 inches in thickness, according to the width of the house. Old railroad "T" rails or second-hand 2-inch pipe can

be used for the main supports. The roof over the drive in front can be wood if desired.

To properly manage such a storage house, the doors and windows need to be left open during the nights of the early fall when conditions indicate frost. In the early morning the house is closed to prevent the rising of the temperature during the heat of the day. If this is followed up conscientiously during the cold nights, by the time the apples are ready to be stored the temperature of the cellar can be run down to 40 or 45 degrees. Later, by the middle of October, a temperature of 35 to 40 degrees can be maintained. From then on, during the winter, proper temperature can be had simply by adjusting the cut-offs in the ventilation.

Such a storage house would cost from $300 to $500 for the material and could be used for either fruit or vegetables. This has proved very successful in the Northern states, but farther south, in the Atlantic states, or south of the Ohio River, has not been a very great success. It is only adapted for the use of the fruit growers of the Northern states who have but a few hundred barrels to store.

Local Cold Storages.—These local storage houses are usually too large and too expensive for individuals to own unless operating upon a very large scale. They are used for the most part by cooperative associations and the small towns that have only a moderate amount of fruit to store. They serve their best purpose in the organizations and have developed to such an extent that they are now used in handling a large share of the fruit. Many organizations shipping perishable fruit have one of these local storage houses near the center of

Fig. 79.—LOCAL COLD STORAGE

the shipping point for the surrounding country. They are often associated with packing-houses, the fruit being brought to the central house to pack and then immediately transferred to storage. Later, as the season advances, the fruit is re-distributed to the larger centers of population. Some of these houses are used only for temporary storages, simply to hold the fruit for a short time until it can be properly marketed. Occasionally the fruit goes from these local storage houses to the larger public storages in the centers of population.

Public Storages.—By far, the most expensive and most important part of the storage industry is the large storage houses in the big cities. These are used not only for storage of fruit but also for the storing of meat products, vegetables, eggs, etc., and in most large cities for the storing of furs to keep during the hot weather of the summer. These fill a very desirable and necessary place in the economy of food supply, especially in the

large cities where from 50 to 150 carloads of fruit are consumed every day. Without cold storage it would be impossible to supply a great many kinds of fruit or any one kind for a very long period of time.

For the most part such storage houses are operated by capitalists and are usually incorporated under the laws of some of the states. They work independently, for the most part, of the producers, simply acting as agents, agreeing to keep a certain temperature for a certain consideration and seldom acting as a selling agent for the owners of the stored goods. Such storage plants are very expensive, costing at the least $100,000 and ranging from that up to two or three millions.

Control of Temperature.—All of the fruit storage houses must be provided with proper means of controlling temperature. Most fruits require a low temperature for keeping. When removed from the tree, this

Fig. 80.—A LARGE PUBLIC COLD STORAGE

low temperature is more important than any other single consideration.

In the various types of storages three methods are employed to regulate the temperature: (1) Ventilation. (2) Ice refrigeration. (3) Mechanical cooling appliances. The first, ventilation, is applicable to the small cold storage cellars in the Northern states or to the dug-out previously referred to. Ice refrigeration is used mainly in the smaller storage and in the North for the larger ones. Mechanical refrigeration is used almost entirely in the South and in the larger public storages of the Northern and Eastern states. The cost of installation between the ice and mechanical methods is considerably greater for the latter. For small storage houses up to 5,000 barrel capacity ice would probably be the cheaper. Above that quantity the consensus of opinion among storage-house men is in favor of the mechanical refrigeration.

Construction.—The materials from which a storage house can be built are numerous. For the cellars constructed under ground, some form of the common hard building materials is used, such as stone, brick, cement, hollow building tile, etc. Of these the cement and brick are more commonly used. Hollow building tile, a burned clay product resembling brick, is coming rapidly into importance, and is considered more economical and a better protection against outside cold. For the part above ground, various materials are used for insulating the houses against the cold or heat from the outside. Wood is most commonly used, and for insulating purposes such material as building paper, sheet cork, felt,

waste cotton, mineral wool, and even shavings or sawdust have been used with good results.

Insulating Materials.—The construction of a modern storage house calls for great care and attention to details of the work. Carelessness or the use of poor material will often result in the inability of the operators to control the temperature of the house. All of the different materials used in construction have different insulating values. The degree with which they will prevent the passage of heat or cold is different with each material used. For determining the insulating value of the different materials, certain units in measuring heat have been established. One used in England, and to a considerable extent in the United States, is commonly known as the British Thermal Unit, or, as it is usually written, B. T. U. It means the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit. The French and German

Fig. 81.—PRESSED CORK

Fig. 82.—MINERAL WOOL

Fig. 83.—FIBER-FELT

unit of measure for heat is the calorie. This equals the heat required to raise one kilogram of water from zero to one degree Centigrade.

Then, in measuring the transmission of heat through various insulating materials, calculations are based upon the number of B. T. U. that will pass through one square foot of substance per hour per degree, difference in temperature between the two sides of the substance. This enables definite experiments to be carried on and

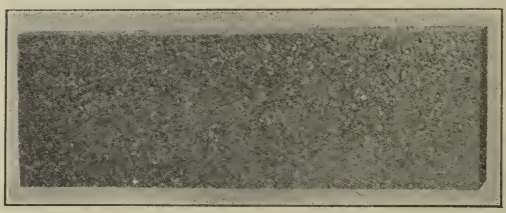


Fig. 84.—CORK BOARD

the insulating value of different materials can be definitely determined. Substances which allow heat to pass through readily are known as good conductors of heat. Those which retard the passage of heat are poor conductors. Hence, for insulating storage houses against heat and cold we always select poor conductors.

Relative Heat-Conducting Power.—From a number of experiments that have been made both in the United States and Europe, the following figures have been taken.

The relative insulating value of the different materials are based on water as a standard. As physicists use water on a basis of one for the specific gravity of other liquids or solids, so in testing for insulating value

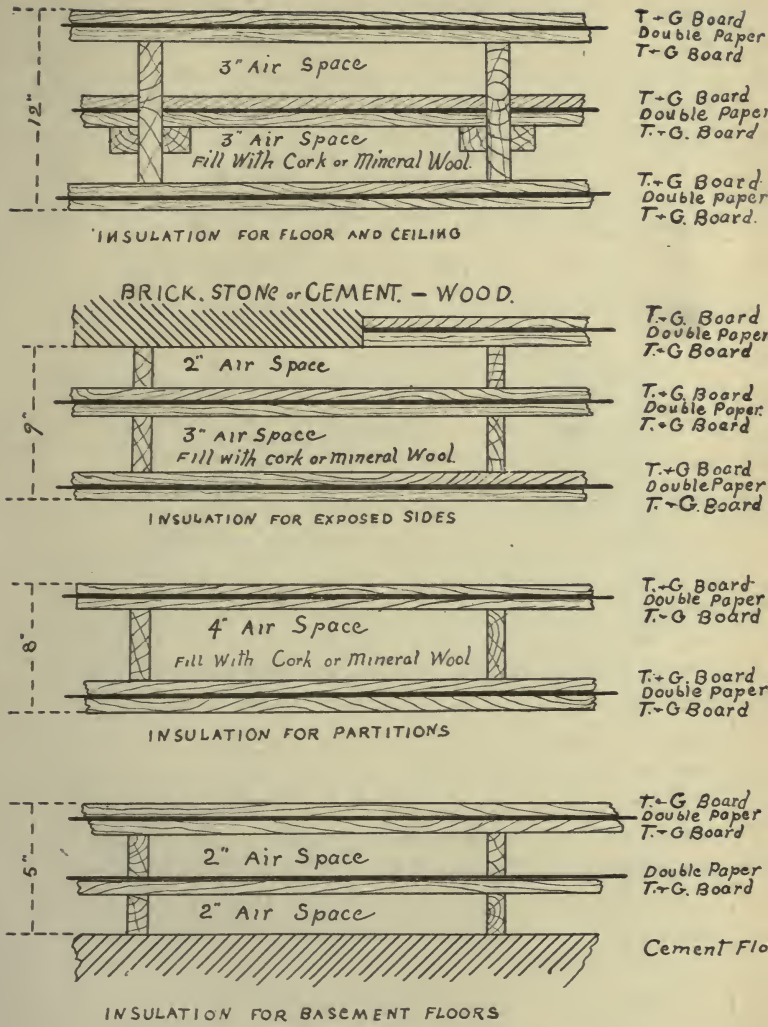


Fig. 85.—INSULATION FOR COLD STORAGE ROOMS

of the different materials, water under normal conditions has been given the value of one. Taking then, water as a standard, the other materials in their relative insulating power would be as follows:

Water	1.
Sand	1.01
Brick	2.
Cement	2.25
Stone	2.95
Iron	80.
Copper	455.
Furs	.0.13
Wood	0.14 to 0.24
Wool	0.06
Building paper	0.05
Dead air space	0.03

It will be noted from these figures that dead air or confined air is the best practical insulator against heat or cold. The best known insulator is a vacuum. The principle of the common thermos bottle is simply the insulating from outside temperature by the use of an almost perfect vacuum. Also, the principles of the common fireless cooker is a perfect insulation to keep the heat confined to the inside of the cooker. Wood is the most common of all insulating materials, and perhaps building paper, sheet cork, and sawdust in the order named are of the next in importance. As a rule, the harder mineral substances are poorer insulators than the vegetable substances, and so stone, brick or cement where used, have to be associated with some of the better insulating materials.

Method of Insulation.—For the most part the outside of cold storage houses is built of either concrete or brick. These are of sufficient strength to support the weight

of the superstructure and to carry the enormous loads of the fruit or material stored. Then inside of these structures are placed the other insulating materials to protect the fruit from fluctuation in temperatures. In some instances dead air spaces are used next to the outside construction, but in most cases they are filled with sawdust or some other loose substance. Then the use of several layers of matched lumber interspaced with

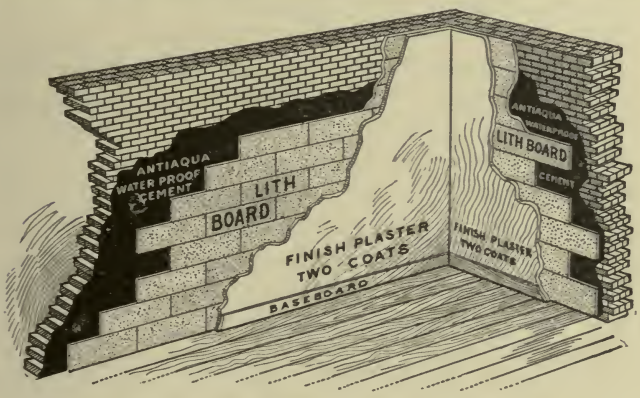


Fig. 86.—APPLYING INSULATIONS

building paper, air spaces or sheet cork gives a poor conducting power for the heat from the outside.

The dead air spaces are at the present time being used less than in former years. While their insulating value is beyond question, yet it has been proved by experiment that it is almost impossible to make the dead air spaces tight enough to prevent leakage or the circulation of air. And where leakage occurs, or moisture obtains entrance, they rapidly lose in insulating value. Another

precaution that is necessary to consider is the waterproofing of the outside walls to prevent moisture from getting into the filler or the papers used on the inside. All of the heavy work, stone and cement, is coated with pitch or some substance to make it impervious to moisture. Each set of material inside is also coated. In addition, from the inside many precautions must be taken to prevent the moisture from collecting on the walls in sufficient quantity to wet the insulating materials.

Mechanism of Cold Storage.—There are two well-recognized systems for cooling down storage houses: (1) Ice refrigeration, and (2) Mechanical refrigeration. The cheaper and most common used material is ice, especially in the Northern states and the smaller houses. The larger storage houses in the big cities or those of the Southern states use mechanical refrigeration. It is difficult to give any estimate of comparative cost because of the wide variation in conditions, labor, cost of material, etc. As a general rule, for small or local cold storage houses ice is considered the cheaper, especially in the Northern states where ice can be manufactured in the winter at a low cost. Farther south it would be necessary to make the ice artificially and the cost would be much greater than for mechanical refrigeration.

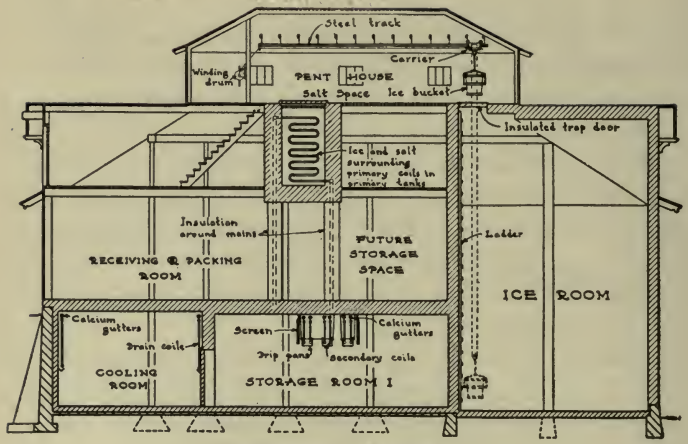
In the larger cities of the East where public storages are common, the mechanical system is used almost exclusively and by most operators is conceded to be the cheapest and the most economical to operate. Storage houses, up to 5,000-barrel capacity, will probably be cheaper to cool by ice than by mechanical means, and the smaller plants operated by cooperative organizations are

for the most part cooled down by the use of natural ice.

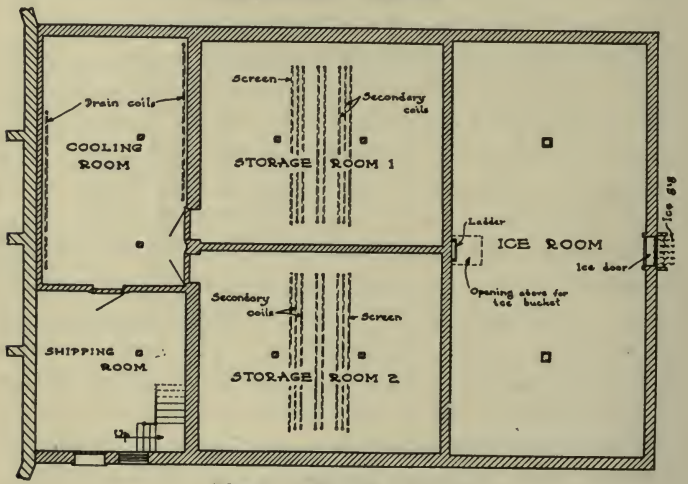
The Use of Ice.—To give the early history of the cold storage industry would be simply to recall the trying out of a great many different methods of using ice. The entire business of cold storage is not over 60 years old and hence its evolution has been very rapid. The first attempt to cool down fruit or vegetables by means of ice, was to place the ice upon the floor of the storage room. It was soon discovered that this method would not be practicable because of the undue amount of moisture in the air resulting from the melting of the ice. Later, various ways were tried, such as placing the ice at the side or above the room to be cooled allowing the air to be first cooled down by flowing over the ice and later circulating through the storage room.

This same principle is still employed in the small refrigerators so commonly used in residences for keeping foods. The ice being placed in the top of the refrigerating box, the air as it flows over it becomes cool and settles to the bottom. The warmed air rising again passes over the ice at the opposite side. This method is not practical for stored fruit or, in fact, is any method applicable where the air is cooled by coming directly into contact with the ice and then distributed through the storage room; the reasons for the failure of this method being due to the fact that the humidity cannot be controlled.

Ice Brine System.—The method used almost exclusively at the present time is what is known as the "Ice Brine System." In this arrangement, the air does not come in contact with the ice nor with the fruit; but coils of pipes in which liquids circulate are first cooled



LONGITUDINAL SECTION



FIRST FLOOR PLAN

Fig. 87.—PLAN OF A SMALL COLD STORAGE PLANT
In this plant the ice-brine system of cooling is used.

down and then by passing through the storage room take up the heat given off by the fruit. In such an arrangement, it is necessary to have two independent coils of pipes. The one that comes in contact with the ice and in which the cooling down is done is known as the primary coil, and the one that circulates through the storage room as the secondary coil.

The principle of this circulation is just the reverse of the hot water system for heating buildings. The primary coil is the one highest up and as the brine in the circulatory system is cooled down it becomes heavier and settles to the bottom. As it circulates through the storage room it absorbs the heat from the room and expanding becomes lighter and rises again, until it reaches the primary coil. In this way a constant flow of the liquid through the pipes keeps the air in the storage room at the desired temperature without the bad effect of the moisture-ladened air coming into direct contact with the fruit itself. In most of these types of storage houses, the ice is harvested during the winter and stored in an annex to the regular plant. Then from this supply the ice is crushed as needed, elevated to the tank enclosing the primary coils, and fed in as desired.

If the natural melting of the ice does not keep the temperature sufficiently low, salt is added to hasten the melting, the theory of the whole operation being that the ice in melting takes up the heat by absorption from the primary coil, thus cooling down the brine inside. The addition of the salt to the crushed ice only increases the rapidity of the melting; hence, increasing the absorbing power of heat from the surrounding atmosphere. Therefore, the more rapidly the ice melts the more rap-

idly is the heat taken up, and a lower temperature can be maintained in the storage room.

The cost of maintaining a low temperature for the storage of fruit is difficult to estimate, owing to the varying local conditions, but for properly constructed and insulated storage houses using the ice-brine system, the cost should not exceed $10 per 1,000 cubic feet per month. A thousand cubic feet will accommodate one carload of produce.

Cooling Solutions Used.—It is obvious that in such a system some liquid would have to be used which would not freeze at the ordinary temperature. For this purpose two different substances have been used. One is the common solution of salt brine; the other is a solution of calcium chloride in water. Salt solution was the one most used in the earlier development of this system, but it is now largely superseded by the calcium chloride. A saturated solution of salt and water will freeze at a temperature of about —7 degrees F.,=below zero, while a similar solution of calcium chloride will not crystallize under —50 degrees F.; hence the latter is better adapted for maintaining a lower temperature. In addition to this, the salt very quickly corrodes the pipes which need to be replaced every four or five years, while with the calcium chloride solution replacing once in ten years is sufficient. For determining the proper density of the solution a common hydrometer similar to the one used in testing lime sulphur solution could be used. For a salt brine solution a 25-degree reading on the hydrometer would be about right, while for the calcium chloride 20 degrees or a little less could be used.

Mechanical Refrigeration.—Space and time will not permit going into this subject in detail, but it seems best to give a general idea of how cold storages are operated under the mechanical systems. Of these there are two general types: the first and older one is known as the air compression system. This was originally installed on ocean steamships where large quantities of stored food products had to be carried. It consisted simply of compressing the air under pressure until the heat was removed and then discharging it direct into the storage room. As the air expands, heat is taken up from the room, thereby keeping the temperature lowered.

This method is still in use in some places but has largely been discarded because of the high cost of operation. The other method, and the one now in most common use, is the ammonia compression system. In this an ammonia solution is used because it will liquify under much lower pressure than air. Large costly machinery of special make is required to operate such a system.

Ammonia Compression System[1].—"The production of cold by this system is accomplished by the expansion or evaporation of liquid anhydrous ammonia. The system consists of three essential parts, the compressor, the condenser, and the expansion coils.

The Compressor.—"The compressor is a pumping engine especially designed to compress the ammonia gas and force it through the pipes of the condenser, under a pressure, varying according to the temperature of the condensing water from 150 to 185 pounds per square inch.

[1] Remington Machine Company, Wilmington, Del.

The Condenser.—"The condenser is a series of pipes through which the ammonia gas is forced by the compressor, and cooled by a constant supply of cold water. The heat acquired during both the expansion and compression of the ammonia gas is absorbed by the cold water surrounding the pipes, and by the combined effect of the cooling water and pressure exerted by the compressor, the gas becomes liquified, and is then in proper condition to do the actual work of refrigeration.

The Expansion Coils.—"The expansion coils are placed either in a brine bath or directly in the room to be cooled, and the liquified ammonia gas from the condenser is fed into these coils by a sensitive valve reducing the pressure to 5 to 25 pounds per square inch, where it rapidly re-expands into a gaseous state, and by so doing, absorbs the heat from the surrounding brine or air, producing an intense cold.

"The expansion coils are connected with the suction pipes of the compressor, and after the gas has performed its refrigerating work, it is drawn into the cylinder of the compressor and is again driven on its round of operation, the same gas being used continuously.

Utilizing the Cold.—"The methods in practice for utilizing the cold produced in this way are the brine system, and the direct expansion system.

The Brine System.—"In the brine system a tank is used containing a strong solution of brine, which is cooled to a low temperature by submerging the ammonia expansion coils in the brine or by means of a double pipe brine cooler, the chilled brine being circulated through a series of pipes placed in the rooms to be cooled

by means of a force pump. For making ice, galvanized ice cans filled with fresh water are immersed in the brine tank to freeze.

"The pipe system for brine circulation can be made up of standard pipe with open return bends, the practice being to use pipes varying in size from 1 to 2 inches in diameter. The pipe system should be divided into sections containing not more than 400 feet of 1-inch pipe or equivalent, provided with valves or cocks and connected to the mains, so that each section can be shut off independently when desired.

"The location of the pipes in the cold storage room may either be overhead or on the sides of the room, the former position being preferable when sufficient height of ceiling will permit. When rooms have been constructed for using ice, the pipe system can be conveniently placed in the ice bunkers overhead.

"The quantity of pipe required for brine circulation in cold storage rooms to produce the desired temperature depends on the class of goods to be cooled, the quantity cooled each day, the size of the room, the character of the insulation, the frequency with which the doors are opened, the temperature of the atmosphere outside, etc. As these conditions vary in almost every case, no fixed rule can be laid down, but it is a good practice to make a liberal allowance of pipe surface for the duty required when the conditions are known, based on practical experience embracing almost every line of work to which mechanical refrigeration is applied.

"The brine used is ordinarily made from common salt, about 2¾ pounds of salt per gallon of water will make a brine registering 100 degrees density on a

salinometer,[2] and which will not freeze at zero. If a temperature below zero is required, chloride of calcium brine is used, a mixture of three pounds per gallon will not freeze at 8 degrees below zero.

"In the brine system the large body of chilled brine contained in the brine tank and pipe coils is a storage for cold, and is a reserve that can be used to maintain the temperature desired in the rooms for a considerable length of time, by merely operating the brine circulating pump. It frequently being only necessary to operate the compressor during the day to maintain the temperature during the entire 24 hours. The ease with which the temperature is controlled, and the absence of any danger from escaping ammonia in the rooms are the principal features that commend this system.

Direct Expansion System.—"In the direct expansion system the ammonia expansion coils are placed directly in the rooms to be cooled, the heat being absorbed by the evaporation of the ammonia in its passage through the pipe coils to the compressor, only one system of pipes being required. The expense of the outfit being very materially reduced, as compared with the brine system, the brine tank, the brine pump and the secondary system of pipes for brine circulation being dispensed with and a somewhat greater efficiency is obtained.

"The arrangement of the pipe coils in the cold storage rooms is the same for direct expansion as for brine circulation, but the valves and fittings must all be of special construction, and the pipes are put up with the greatest care so as to be absolutely tight to avoid the

[2] A salinometer is a hydrometer graduated to show the percentage of salt in a solution.

possibility of the escape of ammonia in the cold storage rooms.

"Owing to the lower temperature and greater rapidity of the circulation of the ammonia gas, only about two-thirds the pipe surface is required to produce the same effect as is necessary for brine circulation.

"In the direct expansion system the refrigerating effect ceases upon the stoppage of the compressor. In small plants where this system is used it is not desired to operate the machinery but a portion of each day. One or more brine storage tanks can be placed in the cold storage room, in which a portion of the expansion coils are placed. The brine being cooled to a low temperature while the machine is in operation, this body of cold brine will help maintain the temperature during the time the machine is shut down. When brine storage tanks are used, they are placed overhead in the room to be cooled, when sufficient height permits, and arranged so as to create a proper circulation of air. The cost of installing a mechanical plant is much greater than for an ice system, but after once installed, especially for large houses, the operation would be much less. And in most places it is considered the most economical system to operate."

Ventilation.—All fruit storage houses need to be constructed with a view to ventilation. This is necessary: (1) To remove the gases given off by the various products stored; (2) To remove the decay organisms that occasionally appear in storage rooms; and (3) To control, to some extent, the humidity required for the best keeping condition of the fruit. In the case of small "dug-outs" or storage cellars on the farm, little

attention need be paid to ventilation, because the opening of the doors and windows to control the temperature will give sufficient fresh air for practically all purposes.

In large storage houses ventilation is attended to regularly and considerable care must be exercised to get the right kind of air and at the right temperature and humidity. For fruit storages, ventilation is preferably given at least twice a week. And certain precautions must be taken. First, the temperature of the outside air needs to be almost the same as that inside of the building. If it is impossible to do this, air is first introduced into the cooling chamber and the proper temperature secured before bringing it into contact with the stored fruit.

Second, the humidity of the air introduced must not vary materially from the humidity in the storage room. For this purpose, certain tests are made to determine moisture content of the air and if care is taken it is usually possible to get an atmospheric condition outside the storage room which will be about the same as the requirements of the humidity inside. Then by rapidly introducing the air this moisture content can be maintained.

Humidity of Cold Storage Houses.—By humidity is meant the amount of water vapor in a given space, and this is usually calculated by weight in grains per cubic foot of air space. In all storage houses, considerable attention must necessarily be given to the amount of moisture in the atmosphere surrounding the stored products. This is especially true in the case of fruit. If the humidity runs lower than required, the fruit will

lose weight by evaporation and will also shrivel. On the other hand, if there is too much moisture the fruit will be likely to decay.

The amount of water vapor that can exist in any given space depends entirely upon the temperature. The higher the temperature the more moisture in a given space. When it reaches its maximum or point of saturation, it is then deposited on the fruit or packages and on the walls of the room and furnishes ideal conditions for the growth and spread of decay organisms.

At one degree Fahrenheit the saturation point for air would be about 0.457 grains to one cubic foot. As the temperature rises, the holding capacity increases until, at 100 degrees, it will hold as high as 19.77 grains to one cubic foot of air space. At a temperature of 31 or 32 degrees, the point at which most of the fruit is held in storage houses, the humidity would be about two grains to the cubic foot of air space.

No very careful figures have ever been worked out for the best humidity for the different fruits, but in a general way they are carried at the same humidity as the percentage of water contained in the fruit. For example, apples will run from 80 to 86% water, and under such conditions the percentage of moisture in the air should be from 80 to 85 in the storage rooms.

The percent of humidity represents only a relative condition. The exact weight of water in a cubic foot of air when the humidity is 85% and the temperature 31 degrees, would be quite different from that for 70 degrees. For calculating the exact quantity of water in a given space, a chart put out by the United States Weather Bureau should be secured.

To determine the relative humidity in the storage rooms two methods can be employed. The first and most common one is the use of the whorl psychrometer (Fig. 88). This consists of a wet and dry bulb thermometer similar to the ones used in the observation stations of the Government. These are arranged so a whirling motion can be given them, and then by noting the different temperatures between the two bulbs, and referring to a table, the amount of moisture can be calculated. Such an instrument costs about $5, and has to be used carefully and skillfully to give satisfaction.

The other method is to use a self-recording machine known as the hydrograph. The principle of this instru-

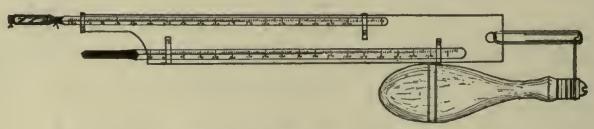


Fig. 88.—SLING OR WHORL PSYCHROMETER

ment is to make a continuous record on a revolving disk, recording during the day the humidity at any given time. The principle of the marker is the expansion of horse hairs due to the amount of moisture in the air. An instrument of this type would cost about $60, and where temperatures run below zero would be of no value.

Controlling Humidity.—It is not always easy to control the humidity in storage houses. If it runs too high certain absorbents are used to take up the surplus moisture. The most common of these are lime and calcium chloride. This is the same form of calcium chloride as is used in the pipes for the ice-brine cooling system.

Where lime is used it is the freshly burned lime or calcium oxide. This is taken into the storage rooms and placed around over the floor in small, open receptacles. It absorbs moisture from the surrounding atmosphere and gradually slakes down, changing to the hydrated form of calcium. This must be carefully watched or its action will be unsteady and a too radical change produced.

A better way is to use the calcium chloride. A few lumps of the raw material are placed on a frame in the upper part of the storage room—they absorb the moisture from the air. Often water will drop from the material in which case it can be caught on a drip-board in the lower part of the support. When this material has absorbed all the moisture it will, it can by simply heating expell the moisture and be used over again. While the raw material is much more expensive than lime it is enough more efficient to make it well worth the extra price.

On the other hand, if the humidity runs too low, it is easy to add moisture by simply setting pails of water in the room or by sprinkling it on the floor. On the whole, storages that are above the level of the ground are more likely to have too little than too much moisture.

Cost of Cold Storage.—There are several different methods in use by cold storage companies for the storage of fruit. Most of the eastern companies offer a double rate system, one by the month and the other by the season. The season storage is, of course, cheaper when time is considered than by the month. Most storage companies run the season from November 1st to May 1st. Some of them make a distinction between boxed

and barreled goods. The end of the season, in case of barrels, is April 1st, while the box goods continue to May 1st.

Some storage companies offer a flat rate for the entire season, regardless of whether the fruit is stored for a short or long period of time. Occasionally large storage companies will contract or sub-lease certain space to small concerns or for the use of other growers or cooperative organizations. Where such organizations need considerable space they can usually secure a more satisfactory rate for the individual than where each grower has to deal direct with the cold storage company.

The prices of storage in the eastern cities do not vary materially from those of the Central states, while most of these are materially cheaper than those of the southern and warmer parts of the United States. The rates of a New England fruit storage company, which follow, give an idea of the different prices charged for both the month and season:

RATE OF STORAGE

	Barrels of Apples		Boxes of Apples	
	Under 300	Over 300	Under 500	Over 500
1 month	20 cents	15 cents	10 cents	8 cents
2 months	30 "	25 "	12 "	10 "
3 months	35 "	30 "	14 "	11 "
4 months	40 "	35 "	16 "	13 "
5 months	45 "	40 "	18 "	14 "
6 months	50 "	45 "	20 "	15 "

The above rates include insurance to the cost value of the apples at the date stored, for the benefit of the party for whom the apples are held.

Also the average prices from several cold storage companies in Chicago is added. These vary to some

extent for the different companies, but the following will give a fair average for the more important storage companies:

AVERAGE CHARGES IN CHICAGO STORAGE

	Per month	Per season
Eggs, per 30 doz. case	15 cents	60 cents
Butter, per 100 lbs.	25 "	1.00
Cheese, per 100 lbs.	20 "	75 "
Apples, per barrel	15 "	50 "
Apples, per box	10 "	35 "
Lemons, per box	10 "	40 "
Oranges, per box	8 "	30 "
Dried fruit, per 100 lbs.	8 "	35 "
Dried nuts, per 100 lbs.	10 "	40 "

Advantages of Public Storage.—There are certain well-understood and well-recognized advantages to be gained from the storing of fruit. Some of these are of primary importance to the producer, while others are more or less in the interest of the consumer. These may be listed as follows: (1) To prevent the fluctuation of prices by offering too much fruit at any one time. (2) To give a large variety for the consumer by lengthening the keeping season of any one kind of fruit. (3) To keep the fruit for a much longer period, thus giving an opportunity to lengthen or even up the supply. (4) To permit the use of more perishable kinds of fruit. These reasons are so obvious, and have been commented upon so much that little need be added.

It is worth while to emphasize the fact that people living in the large cities of the Eastern and Central states would have a very meager supply of fresh fruit during the greater part of the year were it not for the public

cold storage plant. Practically all the fruit in transition from the warmer states must be kept in storage. All the meat, eggs, and other food products which must be shipped long distances could not possibly be supplied fresh were it not for the advantages of cold storage. In fact, in most every case the consumer in large cities uses daily either meat or fruit products which have been kept fresh in cold storage plant.

The volume of business done would run far into the millions of dollars per annum and while creating a good income from the money invested in storage plants they also add largely to the comfort of the consumer who is forced to make the larger cities his home.

Disadvantages of Cold Storage.—There are also certain disadvantages in the use of cold storage and these refer more particularly to the producer or to the person who wishes to store the fruit. First, it is not always easy to foresee conditions and if the producer stores his fruit he must do so at his own risk, hoping that at the proper time the market will rise sufficiently so as to move his goods at a fair profit. The individual producer is at a decided disadvantage in this case because he is not in a position to make a study of the market requirements. On the other hand, operators of the fruit storage houses are themselves in the center of the consuming district and can accurately forecast what may be expected. In some cases, they are willing to advise the storer of these conditions, but this can hardly be expected as a general rule.

The second disadvantage is that the producer has little or no protection. The fruit is often shipped across two or three states, and placed in storage. After

it leaves the home town the grower seldom sees it again and must rely upon the word of the storage people as to its condition. Much dissatisfaction and complaint has been heaped upon the storage companies for taking undue liberties with the goods stored by producers. In such cases cooperative organizations, by being able to have an agent at the centers of consumption, can better protect the interests of the producers.

In the third place, the storage of fruit often causes an extension of credit. This in itself is not a great disadvantage, yet ultimately it cannot but react against the producer. For example, the grower places a large quantity of fruit in storage; he then asks the storage company to advance a certain percent of the value. This the companies are usually willing to do, but in turn charge an interest for the money advanced.

Cold storage companies are willing to advance about half the sum to which the prospective sales will amount, charging from 6 to 8% interest until such time as the sales can be made. This enables the producer to pay for his help in preparing the fruit for market, to carry on his own business interests and live until the fruit is sold. On the other hand, he is not only paying storage for the keeping of the fruit but is also paying interest on the advance of money which rightly belongs to him.

While this is considered legitimate business it is always to the disadvantage of the producer in favor of the storage company. Another disadvantage is that the storage companies are often asked to act as salesmen, and this results not infrequently in certain questionable speculations on the part of the storage houses. The manager of a storage house may receive a bid on a part

of some particular good lot of fruit stored. He immediately wires to the owner offering him a somewhat lower price for the immediate sale of the fruit. The owner not knowing the exact market conditions, and as the price seems good, accepts the offer and is "buncoed" out of his extra legitimate profit.

CHAPTER VI

THE EFFECTS OF STORAGE ON FRUIT

Keeping Qualities.—There are several well-recognized conditions associated with the keeping quality of fruit in cold storage. Other than the storing of first-class fruit, free from blemishes, etc., probably the maturity of the fruit is of the most importance. Various experiments have been conducted along this line and the results show plainly that well-matured specimens keep much better in storage than where they are not fully grown or developed. Apples intended for storage are in better condition if allowed to remain on the trees as long as possible, in order to insure good maturity for storage.

Fig. 89.

Highly colored, well-graded fruit in closed packages keeps best in storage.

It has also been found that the color of the fruit has considerable to do with its duration in cold storage. There is apparently no difference between the keeping qualities of green varieties and of the highly colored varieties so long as the same degree of maturity is maintained. On the other hand, fruit low in color does not keep as well under normal storage conditions. Usu-

ally, fruit that is not well colored is grown in the shade, or some quality of soil or fertilizer is lacking to develop the color, and that usually means a lack of maturity. Therefore, in selecting for good keeping qualities the highly colored fruits or the well developed color of any variety seems to be important.

Fruit that is overgrown or unduly large for the

Fig. 90.—A POOR WAY TO STORE FRUIT EVEN FOR A SHORT TIME

More handling is required, and more shrinkage and decay results.

variety is not good for long keeping in cold storage. It is due, probably, to the fact that the first fruit on young trees do not develop as strong a cellular structure as fruit from older trees, and this is also apparently true of overgrown or over-sized fruit. Thus, for storage as well as for sale, the average or medium-

sized fruit is selected in preference to the unusually large.

Various cultural methods in orchard management have their influence on the keeping qualities of fruit. A number of experiments relative to the influence of sod culture over clean culture for keeping qualities in storage have been conducted and the consensus of opinions indicate that there is no influence in favor of either method. It was originally supposed that apples from sod culture would keep better in storage. This opinion resulted from the fact that apples grown on sod land usually mature a little ahead of those where clean culture is given. Both being picked and stored at the same time, the fruit from the sod would go into storage in more matured condition than where the clean culture was given.

Later experiments showed that equally matured fruit from either cultures keep equally good. On the other hand, the types of soil where fruit is grown has a marked influence on the keeping qualities. Fruits that keep best are grown on the lighter sandy soils. They develop a higher color, and also mature in better shape, thus keeping much better in storage. Fruits from heavy soils, which are of a clayey type, are not so highly colored ordinarily and deteriorate in storage much more quickly than those from the other kinds of soil.

The fertilizing constituents used also have a marked influence upon the keeping of fruit in storage. Soils that are too rich in nitrogen produce fruit with poor keeping qualities. Soils that are deficient in potash or phosphorus, especially the latter, do not produce good keeping fruit. The reasons for this is undoubtedly due

to the influence of the fertilizing constituents. Nitrogen in abundance tends to produce overgrowth of vegetation and under-coloring of the fruit, while phosphorus and potassium develop the flavors and aroma characteristics of the fruit and the high colors that are necessary for good keeping. This is one reason why old, neglected orchards or those badly run down produce fruit that

Fig. 91.—FRUIT STORED IN OPEN BOXES
This is not desirable if it must be repacked before selling.

keeps poorly and is lacking in the right flavor and texture.

The temperature of the fruit at packing time influences its keeping in storage. Fruit that is allowed to stand at a high temperature for two or three weeks will advance in the ripening stages much more rapidly after being put in storage than when transferred at once from the trees to the cold storage house. All fruits intended for storage are preferably graded and packed

as soon as picked, and immediately forwarded to the storage house. Any delay in getting the temperature down to the desired point will have a tendency to shorten the time which the fruit will keep.

Fruit wrappers have a very marked influence on stored fruit. They prevent, to a certain extent, the spread of decay organisms, they help to control the humidity by keeping the moisture from evaporating so rapidly and also prevent the rapid rise of temperature when fruit is taken out of the storage. All these considerations are of importance and the producer who wishes to store his fruit for the longest possible time makes use of them. Where the producer is storing fruit for only a short time, he need not pay so much attention to these conditions.

Freezing Effects.—No doubt almost every orchardist has found fruit that has apparently been frozen and then later thawed out without material injury. This is not only true in the case of fruits but also of vegetables and other products as well. This depends not so much upon the temperature to which the fruit is subjected as upon the way in which it is thawed out. In cases where the temperature does not run too low, if the thawing out is conducted carefully and not too rapidly, the fruit will again take its normal condition and apparently be as good as before. The effect of freezing on fruit is not very well understood but it is supposed that in the freezing process the cell sap is disorganized and a part of it forced out between the cells or into the inter-cellular spaces. Where thawing is gradual this sap goes back into the cells and assumes its normal condition, but where thawing is rapid the moisture evapo-

rates from the outside and the cells collapse, and the structure rapidly deteriorates.

The exact temperature at which fruit may be subjected without injury is still an open question. Experiments conducted at the Iowa station a few years ago brought out the fact that a temperature of 19 to 20

Fig. 92.—BARRELED APPLES IN STORAGE
Where barrels are headed up they are best stored on their sides.

degrees could be maintained for some time and the fruit thawed out gradually with no particular injury either to the flavor or keeping qualities. On the other hand, a drop to 10 degrees almost invariably spoiled the fruit no matter how carefully the thawing process was conducted. Apparently, then, somewhere between 20 and 10

degrees is a point at which most fruits can stand without being injured by the freezing process.

This same condition can often be noted in the orchards of the Northern states before the fruit is harvested. A drop in temperature of three to four degrees below freezing, sometimes accompanied by snow, will freeze the fruit almost through. If the sun comes out brightly the following day, the fruit is sure to be spoiled. On the other hand, if conditions are favorable, the skies cloudy and the temperature rises gradually, the fruit will often regain the normal condition without any bad effects.

Fruit Scald.—This is a trouble which often appears in storage and for which no very satisfactory explanation has been given. It is a physiological trouble, as no decay organisms have ever been found in connection with it. It appears mostly on the surface of the skin, seldom penetrating the flesh. It gives the fruit the appearance of a half-baked apple; the skin turning dark brown in spots. The affected area may be small or extending over a considerable part of the fruit. While it does not materially injure the value of the fruit, it does detract considerably from the appearance, and fruit held in storage for the fancy trade or for dessert purposes is discounted if scald appears.

The cause is purely physiological and seems to be associated only with the lower temperatures in storage houses. It seldom or never develops in common cellars on the farm where the temperature does not run lower than 35 or 40 degrees. It is supposed to be due to an excess of carbon dioxide given off by the fruit in the ripening. There is no very good way of preventing the appearance of scald except in the careful selection of

fruit before storing. There is little difference in the green and the red varieties; but apparently there is considerable difference between the highly colored and poorly colored specimens of the same variety. Most of the trouble appears upon the green or under colored parts of the fruit.

There is also a difference between the fruit of different years or seasons. Some years not over 1 or 2% of scald will appear, while in some seasons as high as 20 or 25% will be affected by this trouble. This is a trouble that is worthy of more serious consideration on the part of various state experiment stations.

Shrinkage in Storage.—It has been found impossible to prevent fruit from shrinking while in storage. This is not of the greatest importance, still it is necessary to consider it. In a good many retail markets it is the habit of dealers to sell fruit by weight rather than by

Fig. 93.—A CONVENIENT RACK FOR STORING SMALL QUANTITIES OF FRUIT

bulk, and in such cases the amount of evaporation may be calculated. Shrinkage is due altogether to the evaporation of moisture from the fruit. Where this is great the fruit becomes shrivelled and gives a dry, unattractive appearance when offered for sale. Fruit that has an oily skin does not lose moisture by evaporation so readily as the russeted or dry-skinned fruits.

The amount of evaporation varies greatly with the different varieties and at the different degrees of temperature at which it is stored. Under normal conditions it will be necessary to make an average allowance of 5 to 10% lost weight for the storage season. Buyers usually estimate from 10 to 15% to be on the safe side and allow for the maximum shrinkage. The only way to prevent undue shrinkage is to pay more strict attention to the humidity of the air in the storage room. Mention has been made of the amount of humidity necessary for the best keeping of the fruit. Where the moisture content of the air or humidity is below 80% a large amount of shrinkage may be expected. On the other hand, even though maintained at the best known standard, 5 to 10% must still be allowed where fruit is stored for a full season.

Decay in Storage.—There are a number of different kinds of rots caused by various forms of fungus growth which are always associated with the storage of fruit. These rots are usually designated by their peculiar effect upon the fruit itself. For example, the most common are the soft rot, the black rot, the brown rot, the bitter rot and the disease commonly known as the black spot or scab, all taking their name from their characteristic appearance. These are all fungus troubles and,

at the normal temperature after the fruit is once infected, develop very rapidly. As the life of the fruit is prolonged in storage the effects of these organisms become more noticeable than in the earlier part of the storage season. All are affected materially by the tem-

Fig. 94.—APPLE SCAB APPEARING IN STORAGE

perature at which the fruit is stored, the lower the temperature the less active is the growth.

It is well to pay particular attention to the grading to see that no affected fruit is put in storage. Practically all of these decay organisms are of such a nature that it is impossible for them to gain entrance to a sound healthy skin and, hence, if there are no punctures or bruises that will break the skin it is not easy for decay to spread. However, a very fine puncture, even as

Fig. 95.—BROWN ROT

Fig. 98.—SOFT ROT OR BLUE MOLD

Fig. 96.—BITTER ROT OF FRUIT

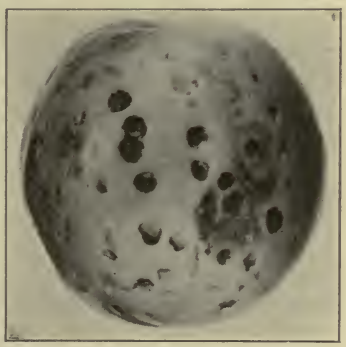


Fig. 99.—BALDWIN SPOT

Fig. 97.—BLACK ROT

Fig. 100.—FRUIT SPOT

fine as a needle point will give ample opportunity for infection from these various decay organisms.

As the temperature of the fruit in storage is lowered the activities of the fungi are lessened, until at a point about 31 or 32 degrees growth is almost stopped. It is not possible to kill or eradicate any of the rots, so far as known, by lowering the temperature beyond 31 degrees. As soon as the fruit is removed from storage

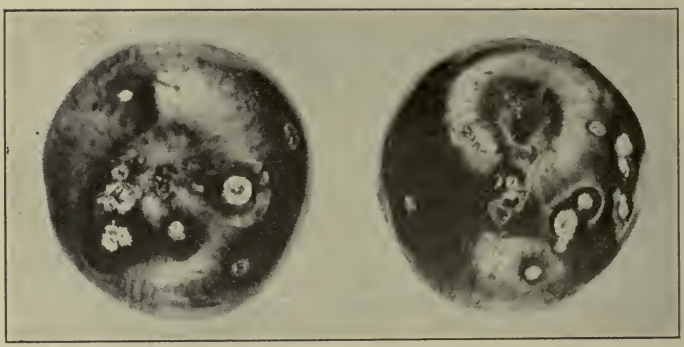


Fig. 101.—PINK ROT FOLLOWING APPLE SCAB

the temperature rises and the decay fungi immediately become active and work much more rapidly than they would previous to storage.

Various precautions need to be taken to prevent the spread of decay in storage houses: (1) The temperature should not be changed more than one degree in 24 hours. (2) The ventilation should be sufficient to remove any of the spores that might be scattered through the air. (3) Where the fruit is wrapped, the packages sealed up and not rehandled until removed from the

storage house, there is much less damage resulting from the effects of these decay organisms.

Paper wrappers are of especial importance because of their insulating value against the spread of the fungus growth. It takes from two to six weeks for the fungus to go through its complete life cycle. Then as the spores are given out they float through the air and finally lodge upon new or uninfected places. Where the wraps are put on in good shape it tends to keep the infected fruit separated from the others and prevent the spread of the decay organisms.

Physiology of Fruit.—While there is still a great opportunity for the study of the physiology of fruits, a few things that are now known may be noted in connection with the keeping of fruit in storage. Certain substances are always present in the chemical make-up of fruits and more or less definite changes are known to take place. By far the greatest percentage of all fruit is water, running as high as 90% in fruit like strawberries and from 75 to 85% in apples, pears, etc., and down as low as 60 or 65% in some of the stone fruit which have a large seed or pit. Most fruits contain various carbohydrates such as the fruit sugars, cellulose and pectin bodies, and there are also certain acids or alkaloids present in almost every kind.

The apple contains malic acid which gives it its characteristic flavor and aroma, while the citrus fruits have the citric acid, etc. These are purely vegetable acids and are difficult to classify from the chemical standpoint. Most fruits contain a certain amount of tannin, especially pome fruits. This, when exposed to the air, is changed into tannic acid by oxidization and is re-

sponsible for the rapid change in color from white to brown in the cut surface of the fresh fruit; also largely responsible for the bitter principle contained in fruits before they are ripe. Most fruits in the ripening process pass through certain chemical and respiratory changes.

Changes in Ripening.—When a fruit is taken from the tree it is not a dead or inert substance, but certain chemical changes continue to take place until the fruit is finally used or decayed. This process is usually spoken of as the "ripening up" of the fruit. The most noticeable change is the gradual transformation of the starch content to sugar. In this way the fruit becomes sweeter and certain aromas or flavors are intensified. The reason for this is due to the fact that abundance of starch is associated with firm, hard fruit. At high temperatures the starch changes rapidly to sugar and the low temperatures do not have the same effect upon the cellulose, hence they soften much more slowly.

Changes in Storage.—The greatest influence of cold storage upon the chemical changes in fruit is to retard them. The fruit kept at a temperature as low as possible without freezing will lengthen materially the life of the fruit by retarding certain chemical changes. The rate of transition of starch to sugar will be much slower in the cold storage house. The time of cooling down also has a marked influence on fruit. That which is cooled down as quickly as possible after being removed from the trees will keep much better in storage than where from two to four weeks elapse before it is placed in the cooling room. With such fruits as plums or apricots it is absolutely necessary that this cooling be done at the earliest possible opportunity after picking.

The size of the package also has considerable to do with the rapidity with which the fruit is cooled down, and hence the attended chemical changes. Large packages like barrels of apples require from 24 to 72 hours for the inside of the package to reach the same degree as the outside. Where the fruit is wrapped in paper, the insulating power of the paper tends to retard the cooling down process. The smaller packages, therefore, are usually preferred by fruit storage men and by fruit growers for the best results in the keeping qualities of fruit in cold storage.

The different varieties and kinds of fruit are affected in widely different ways in cold storage. In such fruits as lemons the desirability of the fruit rests largely upon the quantities of citric acid they contain. It is imperative that no very great quantity of the starch be converted into sugar. With fruits like bananas, pineapples, etc., the quality is improved materially by the increase of the sugar content and, therefore, they are stored in a higher temperature. Thus, every effort is put forth to develop as large a sugar content as possible. With apples, certain varieties keep well in storage while others go down very quickly. It is needless to say that it is seldom, if ever, desirable to cold store fall or summer varieties of apples. Those of standard grade and quality are in all cases the most desirable.

CHAPTER VII

TRANSPORTATION

Freight Cars.—For the shipping of produce to large markets there are four types of freight cars in use. They are known as the common freight, the air ventilated cars, the heated cars, and the refrigerator cars. The common freight are the cars in which ordinary merchandise is shipped and are used in a great many cases for fruit for short hauls, but only rarely are they used for fruit when shipped long distances. While in some cases they give satisfactory results, their use on the whole should be discouraged in favor of some of the other types. In the Northern states the common freight is used to some extent for the less perishable fruits, but more particularly the air ventilated cars are used where it is not necessary to refrigerate the produce in transit.

The air ventilated cars are similar to the common freight except that they are provided with means for ventilation so as to give the fruit pure air while in transit. Also most of the refrigerator cars are arranged for ventilation when ice is not used. Nearly all of the ventilated cars work only while in motion, having small openings in the front, near the end, so when the car is moving the air is drawn through and thus ventilation is provided In the colder states of the North, where fruit is shipped during the winter, such as apples from the

Northeast or Northwest, some arrangement is necessary whereby cars can be kept warm or the contents kept from freezing while in transit.

Various types of so-called heated cars are used for the different kinds of produce. These are more commonly used for potatoes and other vegetables rather than for fruit. The last and most important kind is the refrigerator car which is especially constructed for the shipment of fruit. All of the fruit brought to the Eastern markets from the South and from the far West is handled in these refrigerator cars. They are specially designed and insulated against the heat from outside and are also provided with bunkers on each end to hold ice to keep the fruit cold while in transit. Most all of the trunk line railroads own a large number of these refrigerator cars, but there are also some private line companies which have their own cars and are hauled by the railroads on certain working agreements, usually based on tonnage.

Express Companies.—All shippers of the more perishable fruits must deal with express companies because of the necessary haste in delivery of goods to market. Nearly all the express companies handle small fruit on a large scale. Express rates charged by the various transportation companies are usually very much higher than the ordinary freight rate. On the other hand, they travel on a much faster schedule and, hence, can deliver the goods more quickly. It is seldom possible to ship perishable fruits even for short distances by local freight, hence producers located no farther away than 24 or 48 hours' journey must make use of these express companies to deliver the fruit.

Most companies make special rates for the handling of perishable farm produce, and where delivered or consigned to the commission house the express rate is about half what it would be where delivered to an individual For example, southern New Jersey has a special express rate, to Philadelphia and New York, of about 35 cents a bushel crate of strawberries when consigned to a commission house, but when consigned to an individual the regular charge would be about twice that amount. The express companies explain this discrepancy in that the private crate must be delivered at the expense of the transportation company, while those consigned to the commission house are looked after by the commission man.

Where long hauls are made, necessitating the use of refrigerator cars, fruit can only be handled in carload lots. The cost of icing and handling such cars would be prohibitive if carrying less than the full capacity of the car. In most places where fruit is shipped in large quantities special rates may be had, known as "commodity rates," which means a special railroad rate for certain commodities shipped between certain definite points. And such commodity rates are from 25 to 50% less than the regular rates under ordinary conditions. To get such a rate where none has been previously granted, it would be necessary for the individual or organization to petition the railroads or the railroad commission of the state, setting forth points between which the rate is desired and the commodity to be shipped.

Where such shipments are in more than one state, it will be necessary to petition the Interstate Railway Com-

mission. Such requests are usually considered by the companies and, if they deem them of sufficient importance, are granted, but if not it will be necessary for the state railroad commission to hold a hearing at which the parties wishing the reduction must appear and give testimony in favor of such rates. It is needless to say that individual growers who can do this are very few, and only organizations handling a large amount of fruit can make satisfactory arrangements with the transportation companies.

Private Car Lines.—There are a number of express companies which handle food and fruit products, usually designated as private car lines. These are independent companies owning refrigerator cars which are hauled by the railroads on the mileage basis. In addition, most of the express companies have refrigerator cars in connection with their regular express trade. Some private car lines have from 1,000 to 50,000 refrigerator cars, all in addition to those owned and operated by the regular railroad companies. It has been estimated that 100,000 such cars are in constant use in the United States. Shipping fruit in refrigerator cars has developed so greatly during the past 8 or 10 years that they are now considered indispensable to the general public.

Much criticism has been heaped upon these companies because of rebates accepted and given in connection with the transporting of perishable goods. Time was not long since, when it was almost impossible for an individual to ship perishable goods without patronizing some of these private car lines but, in later years, the supervisory power of the Interstate Railway Commission has been sufficiently strong to regulate the business. The

efficiency and general helpfulness to the producer has increased from year to year.

Parcel Post.—Another means of transporting perishable goods, which is now only in its infancy, is the use of the parcel post. It is not possible to predict at present just how far this service will develop, yet most shippers are looking forward to the time when a real efficient parcel post can be put in operation. There are many reasons, both pro and con, regarding the use of the parcel post for perishable goods, and these are far too numerous to be given lengthy consideration here. The greatest value of this plan lies in the shipping of produce from the grower to the consumer. This will cause the elimination of all middlemen and represent theoretically the ideal condition for marketing farm produce. Its use will be attended by many difficulties until the consuming public has been educated to appreciate its value and until then it will probably not be in extensive use.

Fig. 102.—PASTEBOARD PACKAGES
For sending produce by mail.

In addition to this, the present rate offered by parcel post is not materially less than that offered by express companies and for fruits is still too high to be of service to the individual producer. When the consumers in the large cities can arrange in advance to use the mail to order produce direct from the farms, then will

parcel post become of sufficient importance to be of great value in distributing farm produce. For the past 15 years efforts have been made to produce a workable parcel post system, and have been defeated in almost every case up to 1912 when a bill was passed by Congress inaugurating its use on a limited scale. It has

Fig. 103.—APPLES BY PARCEL POST

since been extended, until at the present time it is possible to ship in quantities as large as 50 pounds in the first and second zones through the medium of the parcel post.

Pre-cooling of Fruit.—All of the more perishable fruits that are usually shipped in refrigerator cars must be kept cool by the use of ice while in transit. Especially is this true of the fruits shipped from the Southern or Western states to the Eastern markets. On the

long hauls it was found that the quantity of ice required and the extra tonnage on account of it, added so greatly to the expense that various methods were introduced to try to cool down the fruit before being shipped. All of this experimenting resulted finally in the inauguration of several pre-cooling systems which are now extensively used both in the South and the West.

Fig. 104.—A SPECIAL CARTON
This carton holds 100 apples and can be sent by Parcel Post in the first two zones.

At present there are two well-defined systems for pre-cooling fruit; one known as the car system and the other as the box system. In the former, the fruit is loaded into the refrigerator cars at the warehouse and run direct to the pre-cooling plant and there cooled down in the cars. In the other system, the boxes are run through a cool room and the temperature run down before loading. Both methods have given satisfaction, but apparently the box system is gaining in importance over the other method. The reason for this lies mostly in two

facts: (1) The box system is more cheaply installed and operated, and (2) the fruit is more easily cooled down before loading in the cars than it is afterwards.

The car system of pre-cooling is so expensive that it can only be installed in centers of production or at the best shipping points. In such cases it is necessary to load the fruit into the cars during the day or evening

Fig. 105.—PACKAGES OF FRUIT READY FOR THE POSTMAN

from each of the warehouses and then run direct to the different cooling plants. Here they are cooled down during the night, and in the morning sent off on their journey. This means that from 5 to 24 hours must elapse from the time the fruit is placed in the cars until it is properly cooled down for shipment. In the hot climates of the South and the West this has been found to be too long a time.

The principle on which these pre-cooling plants oper-

ate is similar to the common cold storage plant. In the warmer parts of the United States, artificial ice would have to be used where cars are iced for transit, so these pre-cooling plants are usually equipped with machinery for making artificial ice as well as for the cooling of the air to be run through the cars of loaded fruit. The

Fig. 106.—DELIVERING BARRELED APPLES TO THE RAILROAD

expense of such plants for the car system runs as high as $500,000 to $800,000. Most of them have thus far been operated by the railroad companies, while those of the box system are mostly operated by the various fruit growers' exchanges. Owing to the great cost of the larger plants they must draw business from 25 to 50 miles from the surrounding fruit sections, while the smaller plants are equipped in connection with the ware-

houses of each of the local exchanges and draw fruit from the area from which the exchange operates.

The fruit is cooled down as soon as it is brought in from the orchard. After being sufficiently cooled, it is stored in a cold room or loaded directly into the cars and sent off. Before the inauguration of the pre-cooling plants, cars of fruit moving north or east during the hot season would need to be iced every four days. In some cases, every three days. This would mean a stop of from two to six hours at certain icing stations along the road to refill the bunkers of the cars. As the railroad companies always charge extra for this it adds very materially to cost of transportation of the fruit.

Pre-cooling plants, for the most part, cool the fruit down sufficiently before starting so that the initial icing is sufficient to carry the fruit across the continent, thus making a saving both in expense and time in transit. In some cases pre-cooling is working so satisfactorily that fruit can be shipped across the continent without any ice in the bunkers.

In the car system for pre-cooling fruit sufficient cooling space and track surface is necessary to accommodate a full train of fruit consisting of about 32 cars. From four to five hours are required to cool down the fruit in these cars to a temperature of 45 degrees which is considered desirable before starting them on their long journey. The method of producing the cold is similar to the ammonia pressure system referred to in connection with the large public cold storage houses. One of the largest of these plants in California contains over 35 miles of pipe coils through which brine with a temperature below zero is circulated. The air surrounding

the pipe coils is cooled down and then conducted through a 6-foot tunnel to the outlet for each refrigerator car. The air is driven by means of a rotary fan.

The cold air is conducted into the cars by means of flexible couplings, one of which is inserted in the vent opening of either end of the car. At first the warm air is drawn off and discharged outside and then as the car is cooled down the heated air, which is drawn from the fruit in the cars, is conducted back into the plant where it is again cooled down by coming in contact with the brine coils. Cold air is forced through the cars at the rate of about 8,000 cubic feet a minute, reaching a velocity of from 30 to 40 miles an hour. It is first run in one direction for a little while and then reversed, so that all parts of the car will be equally cooled down.

In the systems where the boxes are cooled before loading, the fruit is conducted through a cool room by means of an endless belt. This is so timed that, as each package makes one complete revolution, the fruit is cooled to the desired temperature. Thus, by varying the speed of the carrier, to suit the various sizes and kinds of fruit only one handling is necessary.

Moving the Fruit.—In carrying food products to the larger cities which constitute the main markets of the United States, the bulk of the fruit must be shipped long distances. In most cases it must cross two or three states and often go across the entire continent. There is approximately half the population of the United States within a radius of 500 miles of the city of New York. Hence, the bulk of the fruit products must be sold within that radius. The transportation problems then enter largely into the business of moving fruit long

distances to the center of consumption. Where fruit is shipped in carlots, and especially from the South and the West where they run solid trains of fruit, the railroads try to carry these upon passenger schedule or what is commonly known as fast freight.

For the smaller shipments where fruit is carried, not by the carload but in connection with the regular express shipments, they nearly always go in the express cars which run in connection with passenger trains; but where whole trains of fruit are moved, they run on an independent schedule which is somewhat slower than the ordinary passenger time. As the quantity of fruit shipped varies considerably from season to season and from month to month, the railroads have to provide cars a long time ahead and arrange traffic schedules to handle the more perishable goods. They have to provide an enormous number of refrigerator cars, also establish icing stations along the route, and must have large terminal facilities for switching accommodations at the centers of consumption. Then they must arrange a schedule for moving the fruit which will allow it to go through on fast time and have no more delay than is absolutely necessary while in transit.

From the Pacific to the Atlantic coast, it requires from 12 to 14 days to move a car of fruit. Under the pre-cooling system this has been cut down two or three days, and now the railroads are promising to make the entire journey in as short a time as 10 days. Due largely to the stimulating influence of competing lines, this will very materially affect the quantity and the quality of the fruit shipped. It has been the habit in the South and the West to pick the fruit far too green, in order to

allow for the extra time in shipment, and such fruit as grapes and peaches will never properly ripen when picked too early.

Where the shipments can reach the markets in a short time, and where better cold storage can be arranged for in transit, the fruit does not need to be picked until it is more mature. Hence, the quality of the grapes and peaches that come from the West have gradually improved from year to year, until now it is possible to get the more perishable fruits from all parts of the country in as good condition as where grown. This is also true of some of the more perishable vegetables from the market sections of the south.

Ocean freight is a question which, at the present time, is causing considerable discussion among the various fruit shipping organizations. As production increases, outlets must be secured in some of the foreign countries. Until recently, Europe has taken a large proportion of our exports. Now new outlets are sought in other countries such as South America, Australia, South Africa and the Empires of Japan and China. As time goes on, the ocean freight traffic will demand a larger and more careful supervision in full consideration of the fruit industry.

The tendency of the past year or two has been to increase the freight all along the line, both for continental and oceanic traffic. The increase of the foreign or export trade for the more perishable fruits will mean a corresponding increase in the facilities for handling this fruit in ocean traffic. Better cold storage facilities on the boats must be provided, also better means of loading and unloading the fruit so as to avoid injury in the handling.

Some of the larger companies have gone so far as to have their own boats and have worked out a very fine system of handling fruit while in transit. The distance or length of time fruit can be shipped will depend, of course, upon the conditions of climate and the kind and variety of the fruit handled.

In a general way, however, the duration of fruit after picking, without some means of cold storage, would be about as follows for the different types of fruits: Strawberry, 48 to 72 hours; raspberry, 48 to 72 hours; blackberry, 72 to 86 hours; peach, 4 to 8 days; plum, 5 to 10 days; grape, 15 to 30 days; pear, 36 to 60 days; apple, 60 to 90 days; and citrus fruits, 30 to 60 days.

By means of cold storage, together with the proper facilities for handling the fruit, these periods of time can be nearly doubled. Where plums will keep from 5 to 10 days in ordinary storage without ice, under the best conditions they may be kept in good shape from 10 to 20 days.

Loading Fruit into Cars.—The transportation of fruit by rail calls for a very careful consideration in the methods of loading it into the car for shipment. In the first place, all the more perishable fruits must be so piled or placed in the cars that they will have a free circulation of air about every package. In the second place, they must be firm so that the switching or jolting of the car will not displace them. Fruit packages are not overly strong, and if once loosened before reaching their destination are likely to be broken and the fruit ruined.

There are three general methods in use for the packing of boxed fruit in cars. In some cases they are stood on end; in others on their side; and in a few cases,

straight up. In most of the citrus fruit shipments from the West, the boxes are set on end. These boxes are longer than the apple box and have a partition through the center. This keeps the fruit from settling down too much, and by placing the package on end, two tiers will about fill the car to its capacity.

Most of the apples that are shipped from the northwest, the boxes are placed on the side in the car, the long way of the box being placed the long way of the car. They are given air space for each box on the sides, top and bottom, which permits proper circulation. The ends, however, are placed together so as to avoid end play while the cars are being switched or jolted.

In the case of the packages for cherries or grapes or other kinds of small fruits, where the boxes are made more rigid, several are placed together in one larger package like the four-box grape carriers that come from the West. These are nearly always set straight up, leaving the air space, not between each separate box but between each set of six boxes that are set together. In barrels no special precaution is necessary because each package is rigid enough to support the contents. They are usually set on end, two barrels high. In some cases they are laid on the side, but this is not usually desirable except where transportation is by boat. Most of the ocean shipments of barreled fruit are piled on the side instead of on end.

In loading fruit into cars, a layer is placed on the floor of the car in the position desired and then 1 x 1½-inch cleats, long enough to reach across the car, are nailed to the ends of each box and fastened to the sides

of the car. One of these cleats is placed between each tier of boxes. This will prevent both end and side play, also separate each box sufficiently for the proper circulation of air. Each end of the car is loaded in this way until the door in the center is reached and then, instead of filling this space with fruit, it is left open, each half being braced by itself. To do this, 2 x 4-inch uprights are placed in front of each row of boxes and nailed to the floor and roof of the car. Then between these and across the center space are put braces to prevent the giving and loosening of the load.

The capacity of refrigerator cars varies in accordance with the length of the car. Usually they are made in three different lengths, 36, 40 and 42 feet. For apples and citrus fruit, the capacity of these is about as follows: Thirty-six-foot car for apples, 500 boxes; citrus, 336. Forty-foot car for apples, 550 boxes; citrus, 384. Forty-two-foot car for apples, 600 boxes; citrus, 409. Where half boxes are shipped instead of the regular size the number will be about 50% greater. When apples are shipped in barrels, the cars will hold from 150 to 200 barrels.

In ocean traffic, there is, of course, no limit to the number of boxes or barrels which may be shipped on some of the larger vessels. It is not infrequent to find from 40,000 to 60,000 barrels sent to Europe by one boat. While the motion of the larger boats is not usually very great, considerable damage is often done to fruit shipped by water. Most of this is probably done in the loading and unloading of the boat rather than from the movement of the ship. The packages are not ordinarily made rigid when thus shipped. Most of

such fruit goes into the hold of the ship as ballast rather than in any other way.

On the smaller boats for coast or river traffic, fruit is usually loaded by truckers who run the packages down the gangway into the freight quarters, but for the larger ocean boats, the packages are hoisted in a net running from 5 to 15 barrels at one time. These are

Fig. 107.—EFFICIENT TRANSPORTATION ON GOOD ROADS FOR 15 OR 20 MILES

lifted by the donkey engine and lowered into the hold. Where this is carefully done, it causes little injury to the fruit, but where no special pains is taken, fruit can easily be spoiled or badly bruised.

Water traffic is likely, in the near future, to play a very important rôle in competition with railroad shipment of fruit. The Panama Canal will aid materially in getting considerable quantities of fruit products from the Western to the Eastern markets. For perish-

able fruits, it will not be possible to ship by way of the Panama Canal. For other fruits that will stand from 20 to 30 days or more before using, the canal can easily be made use of. From the Pacific Coast *via* the canal to New York and Boston, will require probably a minimum of 20 days and at a total freight cost of half of the overland shipments.

Where the fruit grower is fortunate enough to have a good local market, he has great advantage over distant shippers. Where roads are good and the haul is not over 20 or 30 miles, motor trucks can be used. In many places in the East these are now strong competitors of the transportation companies. Where the business is sufficient to warrant the first expense of a motor truck a considerable saving in time and money can be had over the use of railroads.

CHAPTER VIII

FRUIT MARKETS

Location of Markets.—It has been only in the more recent years that the general fruit-grower or orchardist has taken any interest in the selling of his fruit products. The old custom was to grow the fruit the best he could and then turn it over to some other agency to dispose of. If buyers did not appear when the crop was ready, the only alternative was to send the fruit to some commission man and then trust to luck for results. The present tendency is for the grower to take an active interest in the disposition of the fruit, and in many cases do the actual selling himself.

At present there are three well-defined channels through which the fruit passes to the consumer. These may be defined as the "home market," the city market and the foreign market. The home market is the town, city or village within a few miles of the place of production, where deliveries may be made direct by the grower. The city markets call for the transporting of fruit by rail or water and constitute, by far, the most important outlet. Probably 75% of the fruit actually sold is consumed in the city markets.

The foreign markets are those in other countries besides the United States. Even our neighbor, the Dominion of Canada, where fruit is shipped across the line

Fig. 108.—CATERING TO THE HOME MARKET

only a few hours' journey would be considered a foreign market. These are of necessity more or less arbitrary classifications and will depend more upon the way in which the fruit is handled than upon the location or size of the cities where the fruit is sold.

Selling at Home.—Most producers believe that they can best dispose of their crop in their own immediate neighborhood providing the quantity produced is not more than can be consumed in their particular location. A good many things may be said in favor of the home market and the consensus of opinion among practically all growers is that the home market is the best where the supply is not too large. In the larger fruit-growing sections, much larger quantities are produced than could ever be consumed at home or even in the larger cities of the surrounding territory, hence shipments for long distances to the Eastern markets must be relied upon.

When selling at home several principles enter in, which do not apply in the same way to long distance shipments: (1) This method eliminates all possibility of the profits going to some middleman. (2) It gives the grower a chance to use his own personality by getting acquainted with customers. (3) It allows him to understand their wants and needs and better enables him to grow each year their particular requirements. It also gives him a chance to develop his individual ability along various lines. He comes in direct competition with his neighbor producers, and gives him a keener business insight into the ways and means of conducting a business.

In some cases where it is not convenient to sell direct to the consumers it is occasionally possible to sell to the

retailers or to the small grocery stores in the home towns. Arrangements can be made ahead of time for the grower to produce such material as can be sold readily by the retailer. This does away with considerable personal canvassing and gives the grower more time to attend to the producing end of the business. Furthermore, it often promotes a more friendly feeling between the producers and the retailers because where the grower retails his own produce he becomes a competitor of the retail stores, hence often they do not work in harmony. Where retailers are patronized direct the grower cannot expect as large returns as from the selling of his own goods to the consumer because the retailer must then make his profit which on the more perishable fruits runs from 25 to 100% of the value.

Another method often resorted to by the producer is to sell direct to buyers in the home town. The more staple articles of fruit and vegetables can often be disposed of this way. The buyer then assumes the responsibility of the fruit and does the shipping or selling at his own risks. The grower settles his account then with the buyer and gets his money before the goods are shipped out of town. This occasionally is a very satisfactory method, but often the buyer is well posted on the market conditions and does not presume to take any great risk, hence the price offered for the goods is usually very much less than could be realized if the grower choose to handle the sales himself.

Selling Away From Home.—Where fruit is shipped beyond the distance that it is possible to deliver by the grower, then it must be trusted in the hands of some third party. Often the railroad companies or boat lines

assume a large part of this duty. Such fruit may be handled through the medium of the commission man who then takes his pro-rata toll for doing the work. It may also be sold through certain cooperative organizations controlled by the growers themselves, but this also costs a certain amount and though usually less than the commission house plan requires a certain percentage of the gross sales.

In some cases it is possible for producers to cater to a private trade where the distance for shipping is not too great, such as summer resort places, large hotels, club houses, etc. Arrangements are made, usually several months ahead of time, to deliver certain quantities and kinds of produce to the managers of such places. They always demand the very best that can be had and only growers who are thoroughly versed on producing the best can expect to do very much business with such private trade.

There is also the possibility of putting the fruit in storage when sent away from home. This will depend upon the seller's knowledge of market conditions and, although he assumes the entire risk, he often is sufficiently informed and can profit by so doing. It is exceedingly interesting to contrast these two methods of selling produce either at home or shipping away. They have many points in common, yet differ widely in a great many respects. There is no means of estimating just what quantity or per cent of fruit is consumed at home and what part sent away, but outside of the amount consumed by the growers themselves it is a fair estimate to say that 75% of the fruit products are sold upon the larger market. This means that, by far, the larger

part of the fruit must be handled through the wholesale or larger markets.

The net profits received from such sales are usually smaller than those from the home market. There are so many middlemen and agents that must receive their quota of the sales price, which cuts down the profit much smaller than when sold at home. The competition is also greater. The fruits in the large cities come in competition with fruits from widely different sections. Not only do they come in competition with the same kind of fruits but also with other fruits from the tropics and from the warmer part of the United States.

While the shipper or grower of a certain commodity might not have any competition among the different fruits in his home market he might have considerable in the larger markets of the cities. When growing fruit for the home market a very different grade and quality of fruit is required. The number and kinds of varieties grown is much larger. Home markets usually demand varieties of fruit from the very earliest of the season to those that will extend through the winter and keep late into the spring. This would mean that the grower must select more different varieties than he would for the city market.

Most of the requirements of the large markets are for standard varieties of fruit. This does not mean that a purchaser cannot buy more different kinds of fruit in the large cities than he can in the small ones, but from the standpoint of the grower he would want a less number of varieties for shipping to the large markets than for home use. The quality of the fruit varies in two or three different ways. It is a well-known fact that most

growers shipping to a large market will send away the best fruit they have. Any one that is familiar with the South or with the West, especially California, where many fruits of sub-tropical nature come from, can by walking through the markets of New York, Boston, or Chicago, find better fruit on the markets most any day than he has observed offered for sale in the localities in which the fruit is grown.

The quality of the fruit in regard to flavor and degree of palatability is frequently much better when the home market is patronized. Fruit requiring long hauls is often picked before it is fully matured, hence does not develop as high a quality when sold in the larger markets, especially is this true of the Southern and Western fruits. Fruits like apples or pears to ship well and carry a long distance must have certain qualities of texture and thickness of skin to enable them to be shipped. This condition is often associated with poor eating or cooking qualities of the fruit itself. So the better varieties are grown for the home market; those which have the better quality and flavor. Many such varieties could not be used for general market fruits because of the inability to stand rough handling or long shipments.

Transportation must also be considered when sending fruit away from home. Arrangements must be provided for the loading and handling of cars, also for the trackage and warehouse space necessary on the selling end of the line. This requires considerable skill. Where a large quantity of fruit is handled the services of a special agent who has made a study of these conditions is required. Where foreign shipments are contemplated, ocean traffic, freight rate, tariffs, etc., must be studied

out and it is not always possible for growers of fruit to be in a position to properly handle such matters. Hence, the common advice among small growers is to sell at home what he can and let the rest go.

There are a few well-known faults of producers who sell at home. If he has a surplus he ships it away, and usually the best fruit is what is shipped. Unless there is a large quantity of similar kinds of fruit grown he asks the retailer or consumer in his home town the same price which he would have to pay if he bought from the stores. Often the fruit that he has sent away to other markets will bring him somewhat less than that which he has sold at home. While this is recognized as good business acumen it is a question whether it is conducive to the best interest of the fruit grower.

Supply and Demand.—The two words "Supply and Demand" have been much used and much abused by many of the writers on market questions. There are a number of conditions that effect supply that are in no way related to demand and the converse is true as well. When the supply exceeds the demand it does not necessarily mean that there is an over-production. It simply indicates that there is more fruit offered at any one time than there is a market for. It may also mean that the method of distribution is at fault, or because of the inaccessibility of certain markets the supply can not be reached. On the other hand, because there is a heavy demand for certain kinds of fruit it does not necessarily indicate a lack of supply. The word over-production should not be used in the sense that there is too much fruit grown to meet the needs of the consuming public, because this condition has never been reached.

Among the factors that influence the supply of fruit may be mentioned the following: (1) Weather conditions. (2) Skill necessary to grow the fruit. (3) The climatic zones. (4) Cost of production. (5) High market prices. (6) Transportation facilities. (7) Perishability of the fruit. (8) The storage problem. The first or weather condition probably accounts for the greatest fluctuation in supply. Where certain fruits are grown over a large area there is seldom a total crop failure due to weather conditions.

On the other hand, limited fruit enterprises like the almond industry of the West have occasional years of almost absolute failure due to peculiarities of climatic conditions. In other years it may be unusually good, hence we have the fluctuation in the fruit crops. For example, the apple yield has ranged from 25,000,000 barrels in one season to about 65,000,000 the next, and this uncertainty and variation cannot help but influence to a large extent the price paid for fruit.

The skill necessary to grow fruit is a potent factor in influencing the supply. The more skill required to produce a fruit the higher priced the product, and since extreme high prices are not long in demand the more skill necessary to grow any particular kind of fruit, the less the supply of that fruit. The climatic zones influence market conditions so that it restricts certain fruits to small areas. Where the area that will be favorable to any particular fruit is limited, the supply must be limited or the fruit imported from more favorable foreign countries.

The cost of production very materially influences the quantity of fruit offered for sale. Where the cost equals

or exceeds the market price the incentive to produce fruit is lost, and unless better facilities can be found for growing in those particular localities production must be discontinued. High market prices always stimulate production, hence the supply. Invariably the fluctuation of market prices for fruit, due to climatic conditions, will stimulate interest and when prices are high the incentive is for the orchardist to set out more trees and increase his producing capacity.

Transportation is entering more and more into the supply every year. There are excellent fruit-growing sections in all parts of the United States where fruit cannot be grown simply because transportation to a desirable market is not to be had. In fact, some of our best fruit-growing sections in the far West are yet untouched because there are no profitable outlets to get the fruit to market. Each year some new section is brought into the market by better railroad facilities resulting in an increase acreage, thus stimulating the supply for a given fruit.

Perishability is one of the chief factors influencing supply. Where better storage or transportation can be had, more perishable fruits can be kept through longer seasons, or shipped a longer distance. So the length of time certain perishable fruits appear upon the market will depend largely upon the cold storage facilities for that particular place.

Where factors influencing demands are considered there are several conditions that enter in: (1) The prosperous condition of the country. (2) The quality of fruit offered. (3) Price set. (4) Popular use of the fruit as a food. (5) Knowledge of the fruit. (6)

The seasons of the year. (7) The supply of other fruits. It is probable that the conditions of the country effect the fruit industry as much, if not more, than any other farm product. If the country is prosperous everybody can afford fruit. If the country is not, then the partial luxuries which include many of our better fruits are the first to be dispensed with, in an effort to reduce the cost of living.

The bulk of the fruit in the larger cities is sold to working men—the ones who draw salaries by the week or month, as clerks in factories, shops, etc. When these people are all busy earning good wages they all spend their money freely for fruits and are willing to pay a good price for good fruit. On the other hand, if business is dull many are often out of work. If the conditions, in general, are not encouraging the demand for fruit falls off on account of the reduced ability to buy.

The quality of the fruit offered effects the demand materially. Most people are willing to pay a good price for good fruit. On the other hand, there are many who wait for a lower market price because of a surplus or an unusual heavy shipment, and where the quality is good there is always a ready market. Where the quality is poor the price runs down and the demand usually becomes much less. The price asked for the fruit also effects the demand. Certain organizations establish their own price. If their managers put it too high, buyers will not take the fruit. If the cost of production is so high that the price must be put where the fruit becomes a luxury, then the demand will again fall off.

Certain fruits are used largely in the regular diet as a food. Fruits like the apple, banana, orange, etc., have

become so popular in the home diet that they are no longer accepted as a luxury but are demanded by the regular household, hence a demand is always present for this class of fruit. Many efforts have been made to increase the popularity of certain fruits for food, and this has always resulted in an increased demand. The acquaintanceship or knowledge of the fruit by the buyer has a surprising influence upon the demand of any fruit.

Most of the buyers in the cities do not know that there are more than five or six kinds of apples. Personally they may not be acquainted with more than two or three. Even most of the fruit growers who are familiar with apples and who see upon their markets large numbers of bananas recognize, perhaps, two types, while the growers of those bananas in their native habitat can easily recognize 40. So the knowledge of the variety from the buyer's standpoint effects the demand. No person is willing to go into a store and ask for fruit without knowing just what he wants, hence without bothering to name the variety he buys largely from appearance or looks. Fruits that have a good appearance, nicely packed, are attractive and are the ones demanded by the buyer in the large market.

When ordering fruit from the retailer over the telephone it is a common occurrence to have the groceryman or retailer ask the customer what varieties they want. The buyer unable to name more than one or two kinds selects the one that is best known and well established throughout the whole country. The demand for certain well-known varieties is always much greater than for the less-known kinds, even though they may not be as good as some of the others for the purpose for which they are to be used.

The seasons of the year effect the demand in that most of the buyers in the large cities want fruit only in its normal season. In the spring, everyone is anxious to get strawberries, and while they may be had later in the year, the demand is greatest in the spring because of the habit of people buying fruit only when in season. This has led producers to a great rush to get fruit for the early market, realizing that the prices would be higher because of the increased demand. This has reacted unfavorably against some of the Southern states so that they, in their haste to get fruit on the early market, have permitted themselves to pick it before it is sufficiently matured. As a consequence, the flavor and quality of the fruit was a disappointment to the purchaser and, through this means, certain fruit districts in the South and the West have become unpopular.

Lastly, the supply of other fruits affects the demand through the price of the various kinds. For example, when oranges can be had more cheaply on the general market than apples, most of the consumers will buy the oranges; when the apples become cheaper they will buy those, and when bananas are reduced below either oranges or apples the probability is that the demand will increase for the bananas and decrease for the others.

When considering the price paid for fruit, several important factors appear which are also associated with supply and demand. These could be enumerated as follows: (1) Quantity of fruit offered. (2) Quality of fruit offered. (3) General prosperity of the country. (4) The attractiveness of the fruit. (5) The condition of the market.

If the quantity of the fruit is large the price is apt

to drop. If the quality is good the price will go up, and if poor, the opposite. General prosperity of the country affects the price in the same way as it does the demand, for as the demand increases the price usually goes up. Attractiveness of the fruit has a very material effect upon the price asked. It is a well-known fact that the majority of the consumers in the cities buy on looks rather than upon knowledge of the fruit itself. Hence the package in which fruit is placed has become recognized as a part of the real value of the contents. This is true to such an extent that in fruit shows the judges and the management of those shows attribute approximately a third of the value on the market to the attractive manner in which the fruit is put up.

The conditions of the market are important because the things which affect the market will also affect the price. Markets have their good days and their bad days. Saturday or Friday afternoon are usually recognized as good days for markets because of the stocking-up of the household for the big Sunday dinner. Correspondingly, Monday is usually a bad day. There are fewer calls for fruit than on other days in the week. Markets gradually increase in their condition up until Friday and Saturday and then fall again early Monday morning.

Days just before legal holidays are always good market days. The week preceding Thanksgiving or Christmas or New Year's are correspondingly good in influencing the market. The days following legal holidays are correspondingly poor. Weeks of rainy weather, effects of frost injury and conditions of the country materially influence the price. Instances in which grapes of the

Eastern states have yielded enormous quantities, a frost appearing doing considerable damage to the grapes before most of them were harvested has often jumped the price from 10 to 20% in one day.

Fluctuations in temperatures often influence the price. Large quantities of fruit may be sent into the market in cool weather. If an unusually warm spell appears the fruits will not keep well, hence, must be disposed of quickly. The price is correspondingly reduced in order to move the fruit. Then always the perishability or the relatively short keeping time of the fruit itself forces the sellers to quick action. The price is always regulated so as to move the fruit within a given time because, if it is not moved, it becomes a total loss and no one gets any value from it.

CHAPTER IX

SELLING AGENCIES

Commission House.—The oldest and perhaps the best established method of selling produce in the United States is through the medium of the commission man. At present much discussion and considerable criticism has been heaped upon the commission man and his ways of doing business. Some of it has been just, but perhaps more of it has been unjust. The commission house theoretically, is perhaps an unnecessary institution, but practically no good way has been found to eliminate him. While he is in a measure a necessary evil, he is still a very important factor in the selling and handling of fruit and farm produce. Commission houses are so situated that they can handle either small shipments or car lots. There are a great many fruit growers throughout the country who are not associated with any organization and who have only a very small part of a carload to ship at any one time, and if it were not for the commission houses it would be impossible for them to sell their fruit.

How Fruit is Handled.—The methods of doing business through the commission houses would be about as follows: Many of the houses send out solicitors or traveling agents. They go from place to place requesting that certain shipments of fruit be made to houses in the cities. Often they leave stencils with name and ad-

dress for labelling the boxes, and in various ways make it convenient for the grower to patronize them. They never offer to quote any price or to advance cash for orders but always solicit shipments to be made direct to the commission house.

The grower picks and packs his fruit according to the methods in use in his particular locality and places the address of the house on the packages, takes them to the railroad and sends them off. In a day or two after the goods are sent the grower should receive a card of acknowledgment from the commission man and then, a little later, after the goods are sold, he receives a bill of sale. Where this bill of sale is properly made out it is an itemized list of all the different kinds, grades and varieties of fruit, and if there is one variety that sells in lots for different prices this is also to be listed.

Commission houses get their name from the fact that they charge a certain per cent or commission on the gross receipts of the fruit sold. This is usually 10%, but in some cases they operate as low as 7 or even 5%. When the fruit is sold the commission is deducted from the gross amount of the sale, then the freight is deducted, and if there is any cartage or other charges, that is also deducted and a check drawn for the balance and forwarded to the producer. Along with this goes a receipted freight bill from the railroad or transportation company showing the amount of freight paid for the shipment. It is not customary for most commission houses to do this, but the grower or shipper is entitled to it, and if it is not forwarded with the bill of sale the commission man should be requested to send one.

There are several things for the producer to consider

before selecting a commission house. In the first place, it is always good judgment to find out as much about the various commission houses as possible and get acquainted with the man in charge of the business. Where a grower ships considerable produce to any one commission house it is well to take a trip to the city and familiarize himself with the conditions as far as possible; also with the way in which the house handles his business. Where a grower has only a few dollars of produce each month this would not be advisable, but where it amounts up to several hundred dollars during the season it certainly is time and money well spent.

The wise shipper probably takes several of the produce papers which carry advertisements of various commission houses. After selecting several he will make a trip to the city and investigate the reliability of each one. He can do this, first, by getting acquainted with the men and judging their character from observation. Second, he can ask for bank references and, by looking these up, determine if there is sufficient capital involved to insure prompt payments. He also wants to know if the commission house is a member of the National League of Commission Merchants. He can get information concerning them through that organization. When a house is once selected it is a good policy to stay with it through the season and unless some particular line of fruit demands a change it is well to ship the same varieties from year to year.

Along with this goes certain rules which the producer does well to observe. First, it is well to have a brand or trade-mark for the fruit packages. It has often been observed by the people who are opposed to organiza-

tions, that those who ship through such organizations lose their individuality, but when dealing with commission men the individuality of the grower has a chance for all the expression which he is able to give it. Therefore, by special care in the use of trade-marks or brands placed on packages one can often work up a reliable or enviable reputation for his fruit.

Second, it is well to place confidence in the commission men with whom a grower is dealing and ask advice regarding certain shipments and kinds of fruits, grades, varieties, packages, etc. The honest commission man will give his best attention to this and advise the grower what he thinks best to do. Third, it is well understood that the producer who keeps in close touch with the commission man will get better results from that house than the one who is not sufficiently interested to look into his business methods.

If it is possible to assign any specific advantages or disadvantages to the use of the commission house it might be summed up in the following: (1) Producers can ship in small quantities. (2) Opportunities are greater for the individuality of the producer. (3) It makes an outlet for surplus stock when catering to a home market. The first reason is not a very strong one, because organizations have, now, the means whereby small quantities of produce can be shipped together in carlots. This does apply, however, to certain sections where there are no organizations and thereby affords an outlet for large quantities of stock for short distance shipping.

Opportunities for individualities are often given as a reason why commission houses should be permitted, but this is not a particularly valid reason. Commission

men are interested only in doing business and thus obtain their commission for the sale of the fruit. They have no vital connection with the producing end, and they are not acquainted with the problems which confront the grower. Also, the individuals who can work their personality into something of importance are very rare. A few instances only can be mentioned where fruit is concerned.

On the other hand, the organizations which have become of importance are numerous. The reason for this is obvious: That no one individual grower can produce large enough quantities or varieties of fruit to attract attention of a very wide market. Hence, his brand, which may be excellent, cannot be known over a very wide area. Exchanges handle sufficient quantities of fruit to make impressions on large markets and can afford to advertise so the consumer will know and understand their brand. In this way the individuality of the brand or grade of fruit becomes the important thing, rather than of the person who is growing or producing the fruit.

Making an outlet for surplus is perhaps the most important of the three advantages. There is no question in most producers' minds but that he gets the best results if he can sell his fruit at home, but in many cases the home market is limited. Hence, the only resort left is to ship to the commission houses. These will gladly handle his surplus and get out of it what they can.

The disadvantages of commission houses are purely questions of business and may be enumerated under the following head: (1) Honesty of the commission men.

(2) There is no check on charges or prices. (3) The producer has no opportunity to know or understand the market conditions. The first one need not be commented on particularly. But it is necessary that the grower use his best business judgment in getting a reliable and honest house, and it is due to the unscrupulous commission men that so much vengeance has been declared against them.

The lack of check on charges and prices is a situation which no good reliable business firm would tolerate. It would be out of the question to ask a buyer of a box of fruit to give a receipt for the amount of money paid and these to be forwarded to the man who had the fruit for sale, but yet again in the larger exchanges this is exactly what is done. Commission houses would probably refuse to do this and it would entail considerable bookkeeping and, in many ways, would be impractical from the standpoint of the consumer, and so the custom has been to accept the statements of the commission men and ask for no receipts whereby to prove the correctness. The last, in the producer failing to know the market conditions, is a question of education and one which is vital to the industry of the fruit in general. No longer is it possible to grow fruit and get good results without also knowing of the conditions in which the fruit is sold and used, and the producer who patronizes the commission men who does not have the opportunities to get information of these conditions has little chance to improve himself and become a progressive grower. This, in the opinion of many of the more successful orchardists, is the greatest objection to the prevailing method of commission houses.

In the final analysis, the desirability of the commission man must rest upon his ability to render a real service to any community. Such service can only be measured in one or two ways. First, from the capital involved and, second, by the moral and educational effect. Referring to the capital, of course, it is not possible to give any carefully prepared statistics upon the amount of money invested in commission house business or in the amount of money made on the capital so invested. The commission of 10% is a relatively high profit, and the responsibilities are comparatively small.

A small house capable of handling five or six cars of fruit every week can be easily rented for $100 a month. The commission man and one clerk could handle this business, making the total outlay of $150 to $200 a month. A car of fruit represents from $150 to $800 in money. If he handles four a week he does a business of from $600 to $3,200, and by collecting a 10% profit upon this amount of business he is getting as much returns in one month as the average small farmer gets for his services in a whole year. An orchardist, to produce a car of fruit, must have represented in capital from $2,000 to $4,000. He has his upkeep of this capital, the labor involved to grow the fruit, the interest, etc., upon money invested. For his year's work he gets perhaps as much on the total capital invested as does the commission man on a tenth of the same amount of money in one month's time. It is along these lines that the ultimate service of the commission men must stand or fall.

Cooperation.—Cooperation in its broader sense means the banding together of a number of individuals to do

business together. The number of individuals in the organization or the amount of business done is irrelative to the purpose of the organization. The idea is to cooperate among individuals to carry on the various interests as a single person. Much has been said and written in recent years regarding cooperative organizations among fruit growers, and there appears to be a growing tendency in all producing sections to form some kind of an organization. This is not only true among the producers but also among the sellers or distributors.

From the fruit growers' standpoint, cooperative organization may include the following: (1) The growing of the fruit. (2) The harvesting operation. (3) Packing and grading the fruit. (4) Selling operations. (5) The buying of supplies for the producers. All of these may be included in the workings of the organization, or only a single one of them, yet the purpose of cooperating is still fulfilled. As a matter of fact the principle subject which has led to the organization of cooperative measures has been primarily for the selling of the produce, and the others have developed as incidental to the one big idea.

There are from the standpoint of the organization itself two important kinds: one is known as the profit-sharing organization and the other as the non-profit sharing. Of these two the former is by far the oldest, and the one which is usually referred to where large industries are concerned, such as mining, manufacturing, etc., but in connection with agriculture the profit-sharing organizations have, for the most part, gradually given way or been superseded by the non-profit sharing plan. The former, or profit-sharing organization, is run as a

stock company; that is, stock certificate, either common or preferred, is subscribed among the organizers and the business is then conducted upon dividend-paying basis, the surplus being returned to the shareholders.

To form an organization of this kind, it would be necessary for the promoters to go through the fruit-growing sections and get growers to subscribe for certain amounts of stock. This may be varied from $1 up to $10 or even $50 a share. Stockholders would then become voters in the organization and be responsible for the management of the same. Often, stock is subscribed but only a portion of it paid in, the rest being gradually paid up in the shape of dividends through succeeding years.

The producers must subscribe money before it can be started. It is necessary for them to contribute sufficient sums to get the organization under way, and then they must take chances upon possible returns. Most of the fruit-growing class are more or less skeptical in regard to these organizations and are slow to put up money to properly get them into working condition. Many of these organizations have been failures simply from the fact that a sufficient number of shares get into the hands of more or less unscrupulous men to control the voting powers of the organization, and they then can play into the hands of their competitors and in that way the organization is blocked, hence cannot fulfill its purpose.

The non-profit sharing organizations are the ones which are now being operated throughout the United States and the ones which, with a few exceptions, have made the greatest success. These do not call for the subscription of money among the growers, or for the issue of stock,

but pay running expenses by levying a tax upon each package sold. The idea is simply to deduct enough from the sales of each package to run the business. Most of the money for operating exchanges of this kind is provided by deducting from the sales a flat tax, based on the number of packages handled.

For example, the California Fruit Exchange charges a tax of 5 cents a box on all oranges and lemons sold. Another set of growers charges a flat tax of 1 cent a pound on all almonds handled. Still another exchange levies ¼ cent a pound on all prunes, raisins, etc. This amount, in all cases, has been found sufficient to carry on the business of the exchanges and still have a working surplus to carry them through into the next season. When this surplus reaches a certain amount it is then returned back pro rata to the members of the exchange.

The people who promoted these exchanges first secured the backing of three or four extensive growers in their neighborhood who were willing to advance $500 to $1,000 to get the organization under way. Then the exchanges are effected in the following way: Promoters will visit the orchardists of each section, explain the plan to them, show them in what ways the profits are returned and that there is no money to be put up until there is something to be sold. On the other hand, they are asked to sign an agreement whereby they will not sell any fruit except through the exchange. This ties up their fruit and does not give them permission to sell in any other way.

In this way large quantities of fruit have been secured to sell through the organization almost before the growers were aware that anything particular was under foot.

In some states where laws are not favorable to non-profit sharing corporations, capital stock is issued for just sufficient to cover the requirements of the law; some cases as low as $1 to each member of the exchange. This is turned in to cover office supplies and so on. Then the business is still conducted on the non-profit sharing scheme, still charging a tax just sufficient to cover the cost of the organization with no thought or idea of declaring any dividends upon the original investment. Most states, however, permit non-profit sharing business organizations in which case the small issue of stock is not necessary.

How Organized.—From the viewpoint of managing cooperative organizations, they are divided into three branches: The local, the district and the central organizations. This is especially necessary where a good many individuals are concerned. The local organization is made up of the individuals in a given fruit-producing section. In the small towns or centers of production covering a radius of 5 or 10 miles, growers will get together and organize, to carry on the business of fruit selling or growing in their particular locality. This was the original idea in forming exchanges, and there are still scattered over the United States a number of these local exchanges which have never become affiliated with larger organizations. It was later found that these locals were acting the same as individuals, and where buyers in any fruit sections could secure a price from one local exchange the rest of them would have to follow suit. In other words, it becomes simply a game of competition against each other, as before the organization was formed.

Many of the fruit sections in each district became a competitor of other sections, especially where the shipments were large enough to interest buyers from outside points. After some experimenting along this line it was found necessary for the local organizations to get together and agree on the prices that they were to take for their products. This was in no sense an organization, but simply a mutual agreement. There was nothing to bind this agreement except the word of honor which, in many cases, did not last very long. Buyers and jobbers soon became aware of this condition and often went to unscrupulous means to get one exchange to set its price and then almost compel the other local organizations to fall in line.

Later, it was found necessary to organize these locals into a central exchange and handle the business, not through each local office, but through a general manager who represented all the exchanges. This, in some cases, is known as the central organization, and in others, as the district. Then further, where several states or fruit-growing sections were involved, shipping to the same market became again a question of competition among these districts and further efforts were made to get the districts together and form a central organization.

One California exchange has over 90 local organizations, at the present time, comprising nearly 8,000 members. These local organizations are combined into 15 district organizations and the district organizations again combined into one central exchange. This same plan is followed out by another set of distributors. A large number of local exchanges have formed together

in certain district exchanges. These all combined to form a large selling organization. In this way one man becomes the manager of the organization, handles all the business and has before him information from all the different parts of the country regarding both the markets and the production. He is able to control to a

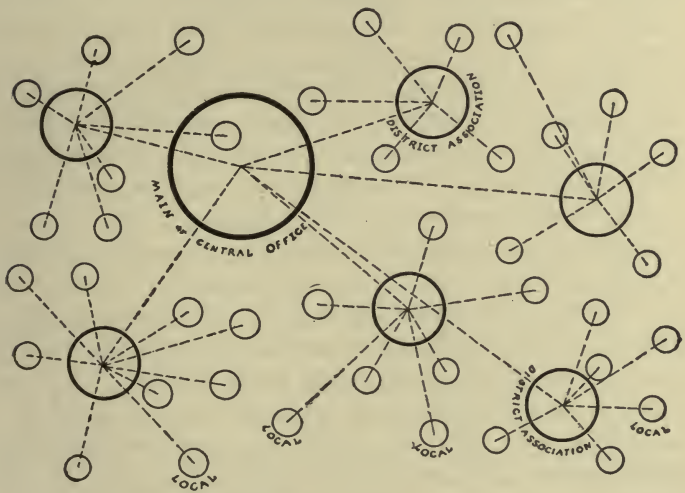


Fig. 109.—COMMON METHOD OF COMBINING LOCAL ASSOCIATIONS INTO A CENTRAL ORGANIZATION

large extent the output, and so places it as to avoid competing against each other and thereby getting a better price.

The Management of Exchanges.—The history of cooperative organizations among farmers is prolific of a wonderful amount of experimental work coupled with considerable loss and a great many failures. It has been

slow to evolve a working organization. There has been two ways in which the management of exchanges has been effected. The first and oldest was probably by mutual agreement. The growers got together and agreed to do so and so. They may have had a constitution and by-laws but there were no particular restrictions against their falling out or breaking away from those agreements if conditions were in their favor and they so desired.

A recent experiment of this kind in one of the Northern states will illustrate the point: A fruit growers' exchange was organized to handle apples primarily. Two men owned a very large number of trees and these constituted the bulk of their apple crop. One year a buyer came in and made these two men a good offer for their fruit on the trees, and they sold. When the organization got ready to handle their business they found that the bulk of the crop had already been bargained for, hence the exchange was a failure.

The present method, and the only one that has been associated with a large measure of success, has been the incorporation of the exchange under the laws of the state. This gives the exchange a legal existence, it has the protection of the state, and also throws around it certain restrictions which are a big help to the producers. Most all states provide for ways and means of incorporating both profit-sharing and non-profit sharing organizations. The Secretary of State usually furnishes blanks for this purpose, and records the articles of incorporation on books the same as a deed is recorded on the county record books.

The organization then becomes a responsible party; it

can buy or sell, do business legally, and the directors become responsible for the business of the concern. Claims can be filed against them or they can file claims against others the same as individuals. They have power and authority to contract with other companies such as railroads or boat lines, to request hearings before state railway commissions, or even the Interstate Commerce Commission. It also gives the individual a right to file proceedings against the organization. In this way the exchange is given the dignity, reality and recognition of which no mutual contract or any kind of an agreement other than the incorporated method can be a success.

Incorporating.—The details of incorporating, of course, differ in different states and vary according to the needs and requirements of the producing sections in which it is formed, but certain articles of incorporation must be made up and filed with the Secretary of the State and, in these articles of incorporation, the state usually requires certain stereotyped information.

In most states the articles of incorporation would have to include the following information: (1) The name of the organization; this to become the legal title of the exchange and it would then be known under that title. (2) The object of the organization; what it proposes to do and the purpose for which it exists. (3) The principal place of business; this is usually where the central or head office is located. It does not necessarily have to be in the close proximity of the fruit-producing section. (4) The term of existence of the organization. This may be 10, 25, 50 or 100 years, according to the wishes of the organizers. (5) The capital stock, both the common and the preferred. Of course, if it is a non-profit

sharing organization this would not be necessary. (6) The number and names of the directors. This is only required in a few states. This requirement was put in so that the number and names of directors for the first year would be known to prevent, to a certain extent, monopolistic tendencies of certain trusts. (7) The voting powers of the members of the exchange. This is worked out in various ways. In the case where stock is issued usually one vote would be allowed with each share of stock held. In such cases anyone having 51% of the stock would have a controlling vote of the exchange, and so some way is usually provided to prevent any member getting more than a 15 or 20% interest in the exchange.

In the non-profit sharing organizations, votes are usually cast in accordance to the fruit handled the previous season. For example, in a certain apple exchange, if a grower shipped, the previous year, 1,000 barrels of apples he would be given 10 votes, or one for each 100 barrels shipped or fraction of 100 barrels. Therefore, in the following year he would be entitled to 10 votes. This would give the larger producers a preponderance of power in the voting, but this is generally considered just because of their larger interest represented.

All this information goes to the Secretary of State and is there recorded upon the books of corporations and becomes common knowledge to anyone who wishes to investigate the matter. Then, associated with these articles of incorporation is the constitution or by-laws of the organization itself. Each local organization may be incorporated separately, and it is not necessary for these organizations to all have the same articles of incorporation, neither is it necessary for the local and the

central organizations to have the same rules governing each. This gives more flexibility to the local organizations and prevents them from getting into any peculiar conditions which would make it difficult to operate them.

One local society might desire to build a warehouse. Another local organization might not. There are a number of other similar cases which might be mentioned due to peculiarities of local conditions. This would not make it feasible or advisable for both of them to be governed by the same strict rules. The by-laws or constitution contains the working agreement of these organizations. It specifies: (1) The powers and duties of the directors. (2) Powers and duties of the officers. (3) The meetings. (4) The declaring and handling of the dividends. If it is non-profit sharing, the arranging of the taxes for operating and plan for disposing of the surplus. (5) The method of electing the directors. (6) The methods of issuing stock certificates, kind and dimension, and so on. (7) Membership.

The membership agreement is necessary and provides ways and means for new members to get into the organization, as well as for a way for dissatisfied ones to get out. No individual will sign himself up for life and, therefore, he must have a means of withdrawing from the exchange if not satisfied. This is usually provided for during one month of each year, most always following the annual meeting and the closing of the business for the fiscal year. Most apple exchanges would have their annual meeting probably in March or April, after the season's crop was all sold, and then the following month an opportunity is given for any member to withdraw by settling his account with the exchange. (8)

Provision for the annual report, the publication of special information and methods of conducting the business for the next year. (9) The rules of the business of the exchange.

Rules for business conduct are usually done away with or passed over by simply stating that the rules will be those usually followed by all legal organizations. This would consist, as followed by most incorporated bodies by first having a roll call of members at the meeting, reading and acceptance of the minutes of the previous meeting, report of special committee, unfinished business, new business, and so on through the election of officers and on down. This is simply a precautionary measure against troubles that might arise from factions in the internal structure of the organization.

The usual methods of electing directors would be for each district or producing section to be represented in the management. Each local association elects one delegate to the central office who becomes a director of the exchange. These directors, then, are responsible for the running of the organization. They hire the manager, fix his salary, and define his methods of business and limit him as they see fit. Most of the directors usually work without salary but getting expenses paid when attending meetings. The only salaried position other than that of manager would probably be that of the secretary of the exchange.

Collecting Information.—One of the chief functions of the exchange is to collect information. This is done from three sources: (1) At home. (2) From city markets. (3) From competing points. The question of collecting information is one that has been sadly ne-

glected by a great many exchanges and one which is vital to the best interests of the organization. In the spring, after the old crop is out of the way and the management is then turning its attention to the oncoming crop he begins to need information regarding conditions from the producing end. The manager makes up a list of questions, puts them in bulletin form, leaving a space to write in the answer and sends a copy to each member.

Among the questions that he would ask would be the following: (1) Name and address. (2) Number of acres in fruit. (3) Kinds of fruit. (4) Estimate of the crop. This is properly done in the early season. Each member of the exchange fills in the blank and returns it to the main office in June or early July. The manager gets the data together and begins to file it in shape to be available later when the time for selling comes. Then a little later in August, or early September, when it would be possible to predict rather accurately the prospects of the oncoming crop, another set of questions would be sent out. This time special attention would be given to the name or the varieties of the fruit grown, the number of trees in bearing of each of these varieties and an estimate of the crop, not only as to the quantity but as to the probable grades or quality.

In the first year of the life of the exchange this is rather difficult to get, but where the information has been kept from year to year through this medium it becomes quite easy to predict a month or two ahead of time what per cent of the fruit will be good and what part will be fancy or No. 1. The manager classifies this information so he is able to forecast pretty accurately

Sample of Information Blank Sent to Members

Form A. INFORMATION BLANK

Notice. Each member of the local association will fill out the following blank and mail to the manager of the ..... Fruit Growers' Exchange by ..... 19.....

1. Name and address.....
2. Number of acres in orchard.....
3. Number of bearing trees.....
4. List of varieties of apples and number of bearing trees of each:

.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

5. Number of barrels harvested last year.....
6. Estimate of crop for 19.....
7. Varieties. Bbl. estimate 19.....

.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

8. How many boxes will you need?.....
9. How many barrels will you need?.....
10. Do you desire the.....Fruit Growers' Exchange to supply your boxes or barrels?.....

Return to .....

Manager..... Fruit Growers' Exchange.

how many packages of fruit he will have to sell, how much of each variety and approximately the quantity in the grades of each kind. When this information is tabulated it is forwarded to the selling branch of the exchange, which immediately proceeds to find sale for the fruit. This method gives the exchange fully six weeks and in some cases three months advantage over the individual who does not make any attempt to place his fruit until it is packed and ready to sell.

Collecting information from the larger city markets is quite as important as that from the producers. The larger exchanges have their own agents in every city. It is the business of these agents to keep in touch with the people who buy, the amount of fruit shipped daily, and the movements of all kinds of produce. Small exchanges which are not large enough to have their own agent, contract with certain selling organizations which make a business of handling fruit, and have these organizations do the work which they are not able to do themselves. It is not uncommon to find one selling organization in a large city handling the business of 40 or 50 of the smaller exchanges. One in particular, in New York City, handles fruit from some of the smaller exchanges from 24 different states in the Union.

The information from the city markets would include the following: The daily receipts of fruit, daily consumption of fruit, daily re-shipments and the general market conditions. In the larger cities considerable fruit is shipped direct and then re-shipped to smaller outlying districts. This information is collected daily, especially through the busy season, and by code telegrams forwarded, each night, by night letter to the gen-

eral manager's office. In the morning the manager will then have all the information from all the larger markets which his agents represent. He would know the general conditions of each market, about what fruit they could handle, what varieties are bringing the highest prices and the general tendency of the market for the next two or three days. He would also have at his finger tips the amount of fruit in the warehouses of the organization, how much would need to be sold at once, and how much could wait. From this information he draws his conclusions as to what markets are best suited to handle his shipments for the next two or three days. In this way it is almost impossible to force fruit upon an already overcrowded market while another city is decidedly lacking in certain grades and kinds of fruits.

The information from competing points is not so important as the other but still is highly desirable. A number of the Western exchanges have men in other states who collect information regarding the crop. One California exchange has its agents in Florida watching the conditions of the Florida citrus crop. Also the Florida organizations have their agents in California. In this way the exchange keeps in touch with the business. One exchange has its agents in Europe, collecting information, and constantly keeps the home office in touch with the fruit situation. This information is collected and forwarded by letter usually, or, if considered important, by wire. The agents report the condition of the crop, quantity and the quality of the fruit, daily shipments, where the fruit is sent and the prospects of the market for the shipments of fruit for the next two or three days or a week.

The manager with this information before him can forecast, daily, about how much the shipments from other sections of the country will come into competition with the fruit which he is endeavoring to sell. By so doing he can place his shipments in such a way that he will compete the least with any other section of the country. Some of the fruit exchanges are so well organized that, almost any day in the year, a buyer can get fruit from their exchange and never hear of a surplus or oversupply. With all this information in the hands of one man, it is possible to work out scientific principles of distribution which will cost the producers the least possible amount in getting the greatest possible returns.

Dispersing Information.—A large part of this knowledge collected by the exchange becomes of interest to the producer, and the exchanges make an effort to place before the growers such information as may be of value to them. One of the chief methods of doing this is by distributing the annual report published by the management at the central office. In this annual report is usually a summary of the business for the year, number of cars of fruit shipped, number of packages sold, the markets to which they went, the general methods of distribution, etc. Then associated with that is a forecast for the coming season. Recommendations for the local associations to follow out in attempting to improve or better their output. This annual report also includes a statement of the finances of the organization, the expenses of the management, the sales department, shipping department, etc.

Another means of keeping the grower informed on conditions of the market is the daily or weekly bulletin,

usually published by the large exchanges. This includes for the most part a recapitulation of the general market conditions. It is usually put out only in the busy season. The information collected by the sales forces and other branches of the work are studied over and summed up in a small leaflet, which is mailed out daily or weekly to the local exchanges and through them to each member of the association.

Another way of furnishing information, although of a different class, is in connection with the Field Organization bureau which advises producers how best to look after their orchards. It issues bulletins explaining the best methods of pruning, cultivating and fertilizing, and general care of the fruit trees. It also furnishes information on other questions, such as the buying of supplies, where to get them as well as the various other articles that are frequently handled through the exchanges. And most important of all is the giving of instruction or information regarding the harvesting, grading and packing of the fruit.

The one great thing which has enabled exchanges to do business as they have lies in the fact that they are able to guarantee their pack. In order to do this they must supervise the grading and packing themselves. It has been found that each grower is not capable of putting up a uniform pack from year to year and, also, that the opinions of different men on just what is included in a certain grade is variable. To be sure of uniformity all the way through, the organizations either have to do the packing or grading or supervise it in some way. In most places they have experts who are trained for the work. Newer organizations have to inaugurate packing

and grading schools during the slack season to give these men sufficient training that they may do the work in a highly efficient and satisfactory way.

Financial Aid.—Another very important consideration in the management of exchange is its ability to aid financially deserving members of the organization. This is done in a number of different ways. In the first place, by assisting in the purchase of farm supplies, such as fertilizers, machinery, fruit packages, spraying material, etc. Occasionally a grower desires to handle these himself, but more frequently the larger exchanges have a purchasing department where the materials are contracted on a large scale and then re-sold or re-distributed to the local association as needed. One large exchange was enabled to save 4 cents on the price of each package by contracting them in 25,000 and 50,000 lots. In this way they saved enough on the price of packages alone to pay the entire management of the exchange.

Another way in which financial aid is often given is through the extension of credit. This is largely in cooperation with the supply department. When the management understands how much fruit the grower will have for sale he then can estimate the needed quantity of spraying material, packages, fertilizers, etc. They are often willing to supply this material as needed and wait for the paying of the bill until the fruit is sold. The grower often gets from $100 to $500 worth of supplies in this way and yet is not compelled to pay for them at any specified time, nor worry about the extension of credit. The price is simply deducted from the sales of the fruit when returns are made. This, with a detailed statement regarding all deductions, gives an

accurate and clear understanding to the grower of how the business is run.

Loaning Money.—Still another means whereby an exchange frequently helps the members is through a loan department. This is purely a financial department where money is loaned to certain growers and is done on a strictly business basis. The one borrowing the money has, of course, to pay interest for its use. Very frequently it is difficult for a grower to get money from the bank or, in the newer sections, it is difficult to furnish security for a loan. In this way the exchange gives a very material aid to its members. In the Western states where large tracts of land are subdivided and sold upon a credit basis, payments to be made upon the installment plan, produces a rapid development of the country and often stretches the credit to the limit.

Where a grower is in need of money he writes to the manager of the exchange stating the facts of the case and then, either through the central office or through the local office, a committee is sent out to view the situation. If they deem that the conditions are fit to warrant a loan upon property it is recommended to the management of the exchange and the money is then forwarded. If not, they of course are under the necessity of refusing to make the loan. Often, through the special service bureau, members are able to make better bargains with real estate companies and to work out their own private problems to a much better advantage.

Subdepartments in Management.—For the convenience of handling the business, the large exchanges organize their managing force into subdepartments just the same as any large manufacturing business would do.

These are variously enumerated, but the following would represent the more common of these subdepartments: (1) Statistical. (2) Traffic. (3) Legal. (4) Field organization. (5) Advertising. (6) Selling. (7) Purchasing. In the smaller exchanges these, of course, are collected together and often one man will handle two or three departments, but as the business increases each one becomes an independent department in itself, subject only to the supervision of the general manager.

The statistical department looks after the collecting of information, largely from the producing end. It gathers figures regarding the acres in fruit, number and kind of varieties and general facts that might be of interest either to the grower or to the management of the exchange. *The traffic department* looks after the movements of the cars of fruit. It keeps records of the numbers and names of the cars and follows them through to their destination. It also is instrumental in getting new commodity rates. It files claims for over-charges or for any carelessness due to the railroad's management. It handles, as far as possible, claims filed against the organization and, in connection with the legal department, looks after the claims brought by individuals against the shipments which may be rejected.

In a recent annual report of a Western exchange occurs the following statement regarding the work of the traffic department. "The exchange has filed with the railroad 6,626 claims for over-charge or damage to fruit in transit—5,745 claims have been paid. And $180,428 has been returned to the shippers, the cost of which is included in the selling expense at 4½ cents a box." This exchange did a business last year of 28,186 cars

of fruit. This, extending through a period of about eight months, would mean an average shipment of 3,500 cars a month, or 100 cars and over a day. As it would require from 8 to 12 days for these cars to reach their destination, that would mean from 800 to 1,000 cars on the road at one time. The traffic department's business is to look after these cars and be able to advise the general management at any time where each car is in its progress along the railroad.

The Legal Department is purely concerned with the business of the law in connection with the management of the exchange. It looks up questions of law. The interpretations of state laws, also national tariffs affecting its business and the attending of hearings before the Interstate Commerce Commission are also important duties. In the small exchanges this simply would constitute a lawyer from some well-known firm who is retained to handle this business, but in the larger organizations it is necessary to have a department for this work.

An illustration of the power of the legal department perhaps can be cited in the following case: A California industry has its strongest competitor in a lemon district of southern Italy. The tariff up to the time of Taft's administration averaged $1 a crate on lemons. The railroad charged approximately $1 a crate freight from the Western coast to the Eastern markets. During Taft's administration, when the tariff was revised, through the efforts of a protective league, the legal department of the Western exchanges was able to have the tariff raised to $1.50 a box for imported lemons. Immediately, the railroad handling the citrus fruit raised

the freight on lemons to $1.50 a box, thus absorbing all the benefits of the tariff.

The exchanges protested this action and immediately started a hearing before the Interstate Commerce Commission. Upon all of the lemons shipped to the East, the extra freight had to be paid, but this was done under protest and receipts taken for every package. The legal department fought this case through the court and in the Interstate Commerce Commission for two years. It was finally settled in favor of the fruit exchange. As a result of this one decision $343,744 was returned to the growers from the railroads on the excess freight for the two years. Only strong, well-organized exchanges doing a large business could afford the expense of fighting a continental shipping organization.

Field Organization Department has to do entirely with the producing side of the fruit. It looks after the interests of the producer. It has experts to advise the members regarding the care of the orchard, pruning, etc. And when it comes to the packing of the fruit it supervises this so as to insure uniformity in both grade and pack. The field organization department is one of the oldest departments and one of the most necessary. It was early found that unless packs were uniform and put up in a systematic way the buyers had no assurance that the label on one package would mean the same as the label on another. Hence the development of this department was found necessary in order to insure uniformity in the fruit, and to enable the organization to guarantee its pack.

Advertising Department is more or less of a recent venture. Exchanges set aside a certain sum of money

each year for advertising and have found that it pays to advertise fruit, as well as a pure food manufacturer finds that it pays to advertise his particular food. The business of advertising is as important to the fruit-selling business as it is in manufacturing. In almost every paper and magazine of consequence will be found advertised the brands of oranges or the sun-cured raisins grown on the Pacific Coast. The Southern states growing quantities of vegetables or fruit have also resorted to various means of advertising. The Eastern states have done this only in a limited way, but are gradually coming to realize the importance of this branch of the industry.

Selling Department of exchanges is probably the most important division of the work. Selling agents have to be stationed in the larger cities of the East and, in some cases, in the foreign markets as well. Each one of these agents is advised of the contents of each warehouse in the local organization; how much fruit there is to be disposed of; about what time it should be placed on the market; and where prices are pre-determined by the management of the exchange, these are also given to the sales agents. The larger exchanges have their own salaried agents in the field. Some of the smaller exchanges cooperate with the larger ones, making use of the information and knowledge of their organization. In still other cases some of them sell altogether through subsidiary organizations which handle only that part of the work. The methods of selling will be taken up in detail later.

Purchasing Department.—The last department which the exchanges have subdivided themselves into is what

might be termed a purchasing department. This, in many cases, is done by the managing office or under his direct supervision. In other instances they have a regular purchasing department. This department looks after the contracting of all kinds of supplies for the producer, such as boxes, packages, spraying materials, fertilizers and chemicals of various kinds. In one or two instances such a department is a subsidiary organization of the regular exchange. It is sometimes a stock company, the stock being owned largely by the members of the exchange. In such cases it would be run independently of the general management. These departments are highly desirable because, by contracting far enough ahead to meet the needs of the growers, considerable money can be saved by buying in large quantities. On the other hand, the producer can always buy his supplies through the exchange, thereby insuring the correct packages or other farm supplies. He can usually get them at a cost much less than if he had to contract or buy them at wholesale. One Western exchange has a subsidiary organization for the purchasing department. This is a stock company and pays dividends to the stockholders. Their aggregate business per year averages about $2,000,000.

Details of Exchange Management.—In the larger organizations each local exchange is provided with a warehouse. In all of these local exchanges that have their own warehouses the fruit is brought in by each grower and is there graded and stored. In some cases the fruit is packed in the producer's packing-house and no central one is maintained. In these cases, however, the packing is done by men under the direction and instruction of

the management of the exchange and not by the individual grower. In the case of the more perishable fruits, like strawberries, and occasionally peaches and apricots, they are packed by the individual grower under the supervision of the exchange. Inspectors are provided that open and inspect a certain per cent of the packages that are brought into the warehouse. If any are found not up to the standard they are returned or repacked at the expense of the producer. In this way the management is able to maintain a standard pack.

Where warehouses are maintained it is necessary to keep a foreman to look after the fruit during the busy part of the year. When each grower brings in his fruit the foreman receives it and stores it away in some special place. He then makes out a receipt for this fruit in triplicate, stating the grower's name, the varieties and number of boxes or packages sent in. The grower is given one of these, one is sent to the manager at the central office and the third is put on the files at the warehouse. This receipt is kept by the producer for references and also to check up returns when final settlements are made.

Where there are a number of local warehouses connected with the central exchange this enables the manager to have at all times before him a complete manifest of the contents of all of the different warehouses. This information is sent by the general manager to each of the selling agents. When an order is received at the central office for a car of fruit the manager looks over his files and determines which warehouse can best load out the shipment. He then wires the foreman of the local exchange instructing him to load so many cars

of so many varieties and grades in each. The foreman carries out these instructions and makes a bill of lading to the railroad for shipment direct to the buyer or to the place of consignment. A copy of the bill of lading is forwarded to the general manager's office and, if the case happens to be a sale that is already arranged, this is forwarded to the agent in the city who has made the sale. That agent then turns over the goods upon their arrival to the purchaser, collects the money and returns it to the general manager.

Every so often, in some cases once a week and in other cases once a month, these receipts are totaled up and the flat tax which goes to pay the expenses of the exchange deducted; the balance is distributed among the various local exchanges. The managing officer of the local exchange then distributes to the individual growers whatever their particular brand of fruit sells for. This does not constitute a pooling of the fruit of different growers, but the fruit of each individual is sold separately, and returns are made separately, so no one loses his identity in any way. It is also a fact that the local exchanges do not lose their identity by combining with the larger organizations. For example, two labels are used on each package. The name of the local organization on one end and of the larger exchange on the other.

Benefits of Cooperation.—Cooperative fruit-selling organizations have been envolved to meet a particular need, and while they have been instrumental in increasing the price of many different kinds of fruit to the producer, this has been brought about by the increase of the quality of the fruit, rather than by the boosting of the prices. In the second place, they have decreased

the cost of distributing the fruit to the consumer because of the greater efficiency in handling the marketing at selling end. There is no longer any question but what cooperative fruit-selling associations are a desirable institution and in many places an absolute necessity.

All of the fruit growers on the Pacific Coast will say that were it not for their methods of standardizing the packages and being able to guarantee these to the Eastern buyers, they would never have been able to develop the fruit industry on the Pacific Coast. While the organizations have not always proved a financial success this was to be expected, because they represented a new industry and the methods and details of manipulation had to be gradually worked out to fit the needs of each different locality.

The benefits of cooperation in fruit selling can be more or less definitely summed up under the following heads: (1) They enable the small grower to ship in carlots. (2) They distribute the crop to prevent congestion upon the market. (3) They have enabled growers to establish standard brands. (4) They have made possible better business methods in handling the produce. (5) They make possible the use of less important varieties of fruits. (6) They allow better equipment for handling the crop. (7) They give an incentive for better care of the orchard. (8) They make a better market stability.

There are also, as might be expected, a few difficulties in the workings of the cooperative organizations. Some of these are more theoretical than practical, but still there is a more or less well-founded objection to the fruit-selling organizations. One objection usually advanced is that independent growers get the benefit. That is, people

who are outside of the organizations reap the increased prices that are maintained by the exchanges. That is an inducement for narrow-minded men to stay outside of the organization. In some cases, prices have been advanced by the associations and the independent growers have reaped the result. In other cases, where jobbers and commission houses handle the fruit of certain sections, they purposely inflated prices to deter men from becoming members of the exchange or to induce those already members to withdraw and weaken the exchange.

Another difficulty often set forth is that of keeping the quality of the fruit up to standard. Some years the different fruit sections might have a poor crop and general climatic conditions make the entire yield of lower grade. In such cases it is particularly difficult to keep a standard pack and grade from year to year. However, this is obviated largely by the guarantee which organizations are able to maintain, and the buyers knowing that if the fruit is off standard, they can demand a rebate or a decrease in price paid for the goods. Another difficulty is in general crop failures. This is only true where the organizations cover limited territory. If a local exchange representing one fruit-growing section has an entire crop failure, this would leave the exchange with practically no work to do for the whole year. Where the locals are combined into a central exchange covering a large territory, this is not a valued objection against the organization, because no large area in fruit production can possibly have an entire crop failure in one year.

The old objection and the one usually advanced is that of jealousy, envy and lack of confidence. While

this is still true in many places in the small exchanges, the conditions are such that the producing men have become broader in their views and are able to put more confidence in the men who handle or administrate their business for them. This is as absolutely necessary in the fruit industry as it is in any line of manufacturing or mercantile business. The old idea of forming a local exchange and employing one of their own members to officiate or administrate the business and pay him a salary which will probably exceed anything made by a great many of the members off of their fruit, led, of course, to many critical remarks and lack of confidence on the part of their manager. This is only petty jealousy and constitutes no valid reason why the exchange need be looked down upon.

Another difficulty set forth in some places is of the monopolistic tendencies of the fruit organizations, claiming that they are in a class covered by the anti-trust or Sherman Law. This has gone so far that, in one or two states, the members of certain exchanges have carried the business into the Supreme Court in an attempt to nullify certain obligations or contracts entered into by members of the exchange, on the grounds of its opposition to the Sherman Trust Law. This has been given at various times as a valid objection to fruit organizations. It has been pretty definitely established, however, that a market for any fruit product as perishable as most of that grown in the United States, can never be monopolized because of the perishability of the goods handled.

CHAPTER X

SELLING METHODS

THERE are various ways by which exchanges do the selling of fruit, depending largely upon the size of the exchange, kind of fruit to be sold, methods of distribution, etc. Among the more important ways may be mentioned the following: (1) Special salesmen under the management of the organization. (2) Track sales. (3) F. O. B. sales. (4) On consignment. (5) Shipment, bill of lading attached. (6) Auctions. (7) Special retail of private markets. (8) Other agencies which include the commission houses, jobbers, selling exchanges and fruit-distributing companies.

The first method in which special salesmen are employed is supposed to be the best because regular salaried agents of the company call upon the trade from time to time and solicit their business for the fruit they have to sell. As a matter of fact the special salesmen are becoming less and less and, as time goes on, will probably be superseded by some of the other methods.

As exchanges begin to multiply and grow more numerous the commission house business will gradually fall off. A conservative estimate, which was recently made, states that the amount of fruit handled by the commission men has decreased 50% during the past five or six years. The special salesmen have been partly responsi-

ble for that. On the other hand, the smaller exchanges are not able to hire a salesman throughout the whole year, so various methods have been devised to eliminate this large expense. It was also found that these agents were more or less competing against other exchanges handling the same kind of fruit, and that this would eventually become one of the difficulties of cooperation. So immediately a move was started to have certain standard selling agencies represent a number of different exchanges. This resulted finally in the establishing of several distributing associations. of which more will be said later.

Track sales and f. o. b. sales are very closely related. Track sales are usually considered as sold on the track in which the fruit is produced, or in other words, the nearest shipping point. An f. o. b. sale means free on board cars at any point designated, hence a track sale and an f. o. b. sale may mean the same condition. It is undoubtedly a desirable way of selling fruit on the track at the point in which it is produced, but this can only be handled under certain peculiar conditions. In the first place, general markets must be such that buyers are willing to go into the field and bid on fruit which may be sold at the track. This further means that only in large producing sections where a good many cars are shipped daily can buyers afford to place agents at these producing points.

Some fruit-growing sections, especially favored by good shipping facilities or a little better quality of fruit, often attract buyers where other sections would have to send out their salesmen and hustle for the trade. Track sales, as a rule, give a little better returns than

where shipments are made otherwise, especially are they better than the average consignment. The exchange management or salesmen can contract directly with the buyer, agreeing upon a price, and then there is no after difficulty from having the fruit rejected. Also the exchange does not have to stand the expense of shipping the fruit or wait for the money after the fruit leaves the track. One large exchange, handling small fruit in Missouri, reported a general advance of strawberries of 60 to 80 cents a crate, where they were sold on track, over that received when consigned.

In the consignment of fruit the method is similar to that practiced by the old commission houses. In fact, many commission men make a practice of handling only carload consignments from exchanges. These consignments may also go through other routes like the auction companies or through a special selling agent allowing them to dispose of the fruit for what they can get. Consignments necessarily follow where the salesmen are not able to handle all the fruit and get orders for it before it reaches the consuming centers. Where cars are shipped long distances they are often handled as "tramp cars"; that is, they are consigned to their agent in some of the Eastern cities.

Points on the Pacific Coast enjoy, for the most part, a flat rate on freight tariffs to any point east of the Mississippi river. These cars are started off as tramps, and upon reaching St. Louis or other points where they cross to Eastern territories they are diverted according to the requirements or conditions of the market. For instance, a recent manager of an exchange reported the following: A carload of pears was consigned to Chicago

from the Pacific Coast. When it reached this city it was found that the markets were glutted for this kind of pear. It was then diverted to Philadelphia, but on reaching there the Eastern agent thought by continuing them to New York the growers could realize a higher price than the Philadelphia market afforded. It was again diverted and, on reaching New York, was sold at an advance of 50 cents a package over anything offered in Chicago or Philadelphia. In this way large oversupplies or deficiencies are avoided.

Where consignments are made to regular commission houses they are usually investigated by the management of the exchange and are often required to give bonds for the proper fulfillment of their business contracts. Such commission houses usually work on a lesser margin than where small shipments are handled. Where the agent of the exchange is also located in the city in which the commission men do business, he is much more apt to do his best for the interest of the fruit growers than he would otherwise.

Another method is to ship fruit with the bill of lading attached. This is followed out by a number of well established exchanges which have no agents. They do their selling through the general office by means of correspondence. This is the common method of the cured fruit exchanges or the various almond or walnut exchanges, where the fruit is capable of being kept for a little longer period of time.

One California exchange found that it was not necessary to have any selling force at all after the first year of the organization. Its method of selling could be illustrated by the following. The commodity is such

that it will keep for some little time. The directors set a price for which the product should be offered to the trade. When this price was agreed upon and the estimates of the oncoming crop tabulated, they sent this information to all of the large buying houses and jobbers in the East, asking them to reserve such quantities as they saw fit.

They did this fully one month ahead of the time at which the fruit was harvested. The buyers in the Eastern markets, knowing that the price had been fixed and they could not get the product at any other place for a less price, immediately wired or wrote the exchange to reserve such quantities as they thought they would need for the year's supply. This particular exchange estimated its entire crop at 2,000 tons. By the end of the first week, after the buyers had been advised of the prices set, all of the crop had been bargained for and 30 carloads in excess of what it could supply. These, of course, were bonafide orders and were booked in accordance with the way in which they were received. Those coming in first were filled first, and if there were not enough to go around the ones ordering last were compelled to take short measures.

When the product was shipped to the Eastern market it was consigned direct to the buyers. Along with the bill of lading went a sight draft attached, covering the price of the contents of the car. A copy of this bill was also sent to the bank through which the buyers were doing business. The railroad then acted as agent to protect the sellers. Before the buyer could gain possession of the carload he was compelled to go to the bank and take up the attached bill, which then became a sight

draft. After being paid to the bank it became a receipted bill upon presentation of which the railroad would deliver the shipment. In this way there was no credit extended and the exchange did not have to wait for its money. This method also prevented unscrupulous business men from beating the exchanges out of their money.

In 1914 this exchange did over $450,000 worth of business, and during that period lost less than $23 on uncollectable accounts. In the last annual report from another exchange, the organization did a year's business of $29,434,402.40. Out of this sum it sustained a loss totaling $355 in bad or uncollectable accounts, making a total of .524% loss in bad debts. This method of filling orders by means of a sight draft attached to the bill of lading accounts largely for the very small per cent in losses. This same method is used also by other exchanges.

It is only possible to do business in this way when the exchange is able to stand behind any price it may set or guarantee any pack it may undertake to sell. When any buyer gets a package of fruit, knowing that if it is not up to standard he may return it and get his money back, he is perfectly willing to invest without first examining the contents of the package. No consumer in any town or city would think of trading for a moment with a grocery store which would not take back goods which were not satisfactory or not up to expectation. Hence, it is only reasonable to say that fruit growers must expect the same conditions if they want to demand the highest price and the respect of the consuming public. It is needless to say that this is one of the hardest problems which exchanges have to contend with and one

which calls for all of the ingenuity human brains can devise to keep and maintain a standard of efficiency.

Auctions.—A method of disposing of fruit which has very recently become quite popular is by means of the auction. These auctions are in no wise connected with the producing end, but are strictly a selling organization. There is one, sometimes two, doing business in every large city of the United States. For the most part they are corporations usually of the profit-sharing kind, their main object being to handle fruit on a basis of gross receipts for the fruit sold. They are not materially different from the commission men except in the very large business that is handled.

To dispose of fruit through an auction company it is necessary first to belong to some exchange or organization. As an individual it is practically impossible to sell fruit through these auctions. They handle very large quantities and mostly from the larger exchanges. Their argument in favor of the auction is quick action in the selling operation. Of the more perishable fruits, this is likely to be to the best interest of the shipper. They work on a very much smaller commission than do the ordinary commission houses and are, at the present time, handling enormous quantities of fruit. Some of the more perishable fruit, like the deciduous kinds from the far West, also the imported lemons and a good deal of Porto Rican and other tropical fruits, are sold almost entirely in this way.

The method of doing business with an auction company would be about as follows: The carload of fruit is consigned to the agent of the exchange, and on the arrival of this car at its destination it is turned over to

the auction company. Auctions never received the cars directly, but they are turned over to them by some authorized agent of the exchange. As soon as a car of fruit is started to the agent, the business manager of the central exchange or the sales department manager makes a manifest of the contents of the car, giving the name of each individual who had fruit in the car, the quantity,

Fig. 110.—ARRANGING SHIPMENTS IN THE WAREHOUSE OF THE AUCTION COMPANY

variety and grade. This manifest is forwarded to the agent and a copy of it turned over to the auction company.

The auction company then proceeds in one or two ways, some take samples from the fruit when it arrives and sell entirely from the samples. Others make up a catalog (Fig. 112), and the fruit is inspected in the warehouse or in the car, and then bid off according to the statements in the catalog. Where these manifests arrive a day ahead of time they can be cataloged and ready for the auction at the next morning. Cars that have arrived during the afternoon and night of any one

day are usually sold on the next morning's auction. They are usually put up in lots of 10 or 20 packages, and if any individual happens to have less than a lot of 10 they will be auctioned off separately, allowing each man's fruit to be sold by itself.

Most auction companies provide regular warehouses in which the fruit can be handled. They also have con-

Fig. 111.—FRUIT SAMPLES ARRANGED IN THE WAREHOUSE OF AN AUCTION COMPANY

venient auction rooms. These are arranged something like the seats in a theatre (Fig. 113). Each member belonging to the auction company is assigned to a seat and, when anything is put up that he is interested in, he goes and bids in as much as desired, as each article comes up for sale. This makes everything open and above board, and gives a chance for the public and the owner to go in and watch his goods auctioned off, and gives an opportunity for the agent of the company to check up. There is not the possibility of doing the rebate work that sometimes occurs in the other lines of fruit selling.

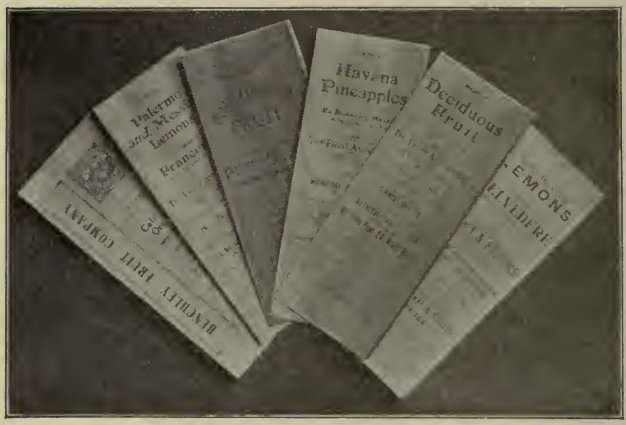



Fig. 112.—CATALOGS OF AUCTION SALES

Most of the auction companies pay the freight, switching car service, demurrage, and incidental charges, and deduct the amount from the gross proceeds of the sale of the goods that are shipped them. A check covering the net proceeds of each shipment is mailed to the man-

Fig. 113.—FRUIT AUCTION ROOM, NEW YORK CITY

ager of the exchange within 24 hours after the sale. For the service rendered, the auction companies get their pay in two ways: first, they charge the people who are dealing with them a price of 5 cents a package for the purpose of doing business through the auction. This goes to defray the expense, discount, collection, and of guaranteeing the sale. They also receive from 2 to 3% of the gross sales from the shippers for handling the goods. Thus, the buyer as well as the seller contributes a certain amount to the maintenance of the auction business. Every concern that is engaged in the auction business has a set of rules whereby it governs the people who do the buying. A copy of the rules governing the sales of one of the better known companies is added, so that the reader may see more clearly the method of handling the fruit:

TERMS OF SALE

United Fruit Auction Company of Detroit, Michigan

To those having established credit, bills are due and payable the second day following date of sale, and must be paid at such time or no further credit will be extended.

Those NOT having credit must make a deposit, before sale, of FIVE DOLLARS or more at the office, as a guarantee of good faith, or bid will not be recognized at the Auction.

All goods are sold as they are and where they stand, with absolutely no discounts or rebates.

Samples are selected at random, or as they come, with no effort to conceal quality or condition.

Buyers are invited to thoroughly inspect fruit before sale, but are requested to leave same in condition as found.

Sampling is Positively Prohibited.

Ten packages will be the minimum quantity that will be sold or invoiced to any one buyer unless the line being sold contains less than said number.

All goods must be removed immediately after the close of the sale, and if not so removed within three hours, goods will be delivered at the buyer's expense.

Under no circumstances will buyers be allowed to re-sell goods on the floor of the auction room.

Every package sold subject to our usual terminal or warehouse charge of 5 cents per package.

The auctions are made use of by the large exchanges in several ways. In the first place they get quick ac-

Fig. 113*a*.—DELIVERING AFTER THE SALES

tion for the more perishable goods, even where there are special salesmen endeavoring to hunt markets. Cars that start out from their origin as "tramp cars" are always intended to be sold before they reach their destination. In case they still remain "tramp cars" until arriving in the larger market, they then must be disposed of. This always gives the exchanges a chance to get the fruit sold in a very quick and efficient manner.

Exporters of fruit imported from Europe and from the other continents did not find it convenient to keep

a sales force in this country. They simply have one agent and, by consigning everything to this agent, allow him to handle an enormous business through the auction companies. Even large organizations sell practically all of their imported fruits through the auction companies. In a like manner most of the fruit that is shipped from

Fig. 114.—THE FREE CITY MARKET AT BOSTON, MASS. Many cities have similar free markets where produce may be sold as it comes in from the farm.

the United States to England, especially fresh fruit, is sold at auction abroad.

Their method of doing business is somewhat different than the auctions in the United States, in that it is more strict and has less publicity. Fruit that is imported from the United States is taken to the dock and samples opened up for inspection. Most of the auctioning is done in the warehouse, on the docks. The fruit is sold in barrel or box lots, the auctioning lasting from 10 o'clock in the morning until the day's shipments are sold out. There are four or five auctioneers taking turns

of 20 minutes each. They are paid on a commission basis for the amount of fruit they sell.

No one in England except licensed buyers are permitted in the auction room. They have to pay certain fees to belong to the company and to have the privilege of buying. Each one's record, his bank references and reliability must be certified to before he can become a member. This apparently is necessary in order that the auction company may guarantee their sales. They are supposed to remit within 24 hours after the sale and then collect from the buyers cash in 5 to 10 days. If buyers were allowed indiscriminately to bid in the fruit there would of necessity be considerable chance for buyers to default, and then the auction company would be the loser. Hence only regular licensed members can buy fruit at the auction of the foreign markets.

Special Retail.—This is a system of disposing of fruit that has only recently become of any material importance. The tendency is to eliminate the middleman wherever possible and deal direct with the consumer. To do this several methods have been made use of. The most common is the parcel post. Many of the more perishable fruits can now be packed in special cartons and sent through the mail direct to the consumer. Some of the less perishable kinds of fruit and their by-products, such as prunes, dried fruit, nuts, etc., enjoy an especially low postal rate, hence there are possibilities in disposing of large quantities of fruit in this manner.

Many of the various express companies have followed the example set by the Government in the use of the parcel post, by establishing low express rates intending

to favor special retail. One company has, in addition to the above, attempted to help sales by finding markets for the produce. This is done by organizing family purchasing clubs in the larger cities, and furnishing such clubs with prices and kinds of produce that can be delivered. This furnishes an outlet for certain growers who are favorably located and care to list their goods with an express company. This plan is reported as working

Fig. 115.—PEDDLING FRUIT IN ONE OF THE TENEMENT SECTIONS OF NEW YORK CITY

successfully in several cities and its prospect for doing an unlimited business depends almost entirely on the skill in perfecting the buying agencies.

Certain progressive fruit growers have for years enjoyed special retail markets such as hotels, summer resorts, club houses, etc. This method is now being enlarged upon and cooperative fruit organizations are supplying direct many such places which were previ-

ously being handled by wholesalers or commission houses. Such markets are usually highly specialized and call for high grade fruit. Many organizations are well qualified to handle this trade, as their goods are standardized and their ability to deliver the right produce at the right time wins the respect and confidence of the patrons.

Other Agencies.—There are various other channels through which fruit may pass to the consumer, repre-

Fig. 116.—FRUIT STANDS ON THE STREET NEAR GARBAGE BARRELS

sented for the most part as a side issue of some large produce-handling organizations. Some of the more common of these that might be mentioned are the produce jobbers, the selling exchanges and the fruit distributing companies. Many of these are large, well-organized companies and do a tremendous business in food supplies. As some of these agencies will be considered separately later on, their method of handling the fruit may be here omitted. Suffice it to say that these or-

Fig. 117.—BUYING FROM PUSH-CARTS—EAST SIDE, NEW YORK CITY

Fig. 118.—A NEW YORK SIDEWALK FRUIT MARKET, BOTH WHOLESALE AND RETAIL

ganizations are not interested in production and only concern themselves in problems of distribution.

Retailing.—This is the last step in which the fruit passes into the hands of the consumer. The retailer is the one next to the producer who is most vitally interested, as he pays the bills and commissions to all the

Fig. 119.—A SPECIAL RETAIL MARKET

middlemen. Retailing is the most expensive part of all the processes of distribution, because it involves the element of service which the city buyer demands. The fruit in itself may be comparatively cheap but the expense of getting it to the consumer is often large. The crowded conditions in the cities, the reluctance with which the average commuter carries home packages, and the lack of judgment and foresight displayed by the average housewife in buying supplies, all contribute to the cost of service. This is a difficulty that can only be remedied by cooperation among the retailers. At present

Fig. 120.—A SIDEWALK USED AS A FRUIT MARKET. DECIDEDLY UNSANITARY

there is no strong incentive for such cooperation and it will be necessary for the buyers to take the initiative.

There is a branch of the fruit retail trade which has to do with the street stands, booths, pushcarts, etc., which cannot be passed over without a word of comment. These doubtless fill some definite need in the economy of distribution, but their methods of handling

Fig. 121.—FRUIT MARKET UNDER WILLIAMSBURG BRIDGE, NEW YORK CITY

the fruit are often open to objection. Such stands are usually out in the open, exposed to the dust and dirt of the city streets, the fruit is polished and handled with dirty hands and is in many ways unsanitary. Some cities have inspection laws covering their fruit stands but, mostly, they are operated with entire disregard to approved sanitary conditions.

Fig. 122.—A LESS OFFENSIVE FRUIT STAND

CHAPTER XI

SPECIAL FRUIT ORGANIZATIONS

Fruit Distributors.—During the past five or six years a new type of fruit organizations has appeared which has to do exclusively with the selling or distributing of the fruit. Some of these take the title of exchange but most of them are known as distributing associations. These kind of organizations have been the outgrowth of definite efforts to simplify the methods of distribution. The old plan where each exchange attempted to do its own selling was found to be cumbersome and too expensive. As the number of exchanges increased it was found that they were competing with each other in selling the fruit. This called for higher priced salesmen and various additional expenses. Later, many local associations combined and attempted to sell the output through a central office. This worked well for a while and, at present, the bulk of the fruit is being handled in this way. Now, when there is scattered through the Central and Western states over 300 fruit organizations, this method of distributing was again getting cumbersome. Thus special distributing organizations have resulted.

California Fruit Distributors.—This was the first effort to combine a number of exchanges for the exclusive selling of the fruit. Delegates from the various organizations formed a separate corporation. The selling forces

of all the exchanges were combined thus reducing the cost and increasing the efficiency. This organization is now handling all of the fruit for 15 companies comprising about 15,000 cars annually.

While it may appear to the casual thinker that this system of distribution complicates matters, it in reality simplifies them. The exchange can pay more attention to the production of fruit, and when it is ready for sale turns it over to the distributors. The delegates from the various exchanges become directors in the distributing association, hence the management is always within the control of the producing organizations. The system of distributing unifies the methods of handling the fruit in so far as the marketing is concerned. Uniform rules regarding the harvesting and packing are established, and instead of having several different grades or brands one or two set standards are established. This larger quantity of fruit handled attracts attention on the larger markets, enables better methods in advertising and reduces the cost of selling the fruit.

North Pacific Fruit Distributors.—At present this organization represents the largest distributing association extant. The four states of Oregon, Washington, Idaho and Montana comprise the territory covered by the association. All of these states have had active fruit-growing organizations for years, some of them having a membership running up into the thousands. These organizations represented an industry approximating 250 millions. The great extent of the business handled, and the fact that the bulk of the sales must be made in other states than their own, made competition in the selling end uncomfortably keen. Progressive leaders of

the business were constantly looking for means to eliminate or at least simplify the trouble of selling.

The first step towards the organization of a central selling agency of Northwestern fruit was taken at the meeting in Prosser, Wash., in January, 1911, and committees made up of representatives of the different fruit districts worked in conjunction with the only cooperative non-profit fruit organization then in existence in the Northwest; namely, the Yakima Valley Fruit Growers' Association. They worked out a set of by-laws at a series of meetings held in the fall of 1911 and the spring of 1912. These different plans as worked out at these meetings were brought to Spokane in November, 1912, during the National Apple Show, at which time the distributors were organized. This is a purely mutual corporation without capital stock, organized under the non-profit sharing laws of the State of Washington. The association now comprises nine central exchanges, composed of nearly 100 local associations which in turn are made up of over 7,000 members, all fruit growers. The Board of Directors consists of nine members, one from each of the central exchanges.

The first step this selling organization took was to draft a set of rules for all the local associations to grade and pack their fruit by. This immediately unified all the grades and packs of fruit and permitted a guarantee of standard packs. The carrying out of this part of the work was left to the various producing organizations. Inspectors were maintained by the distributors to keep the grades and packs up to standard. The second step was to organize a selling force that could handle the large output. This was done by establishing agents in the

big markets of the East and in Europe. In some cases these agents were salaried men in the pay of the association, in other cases they were general produce handlers who were willing to accept the exclusive agency for the association for a given territory. In a few cases they simply affiliated with some other exchange already having an established territory. In this manner 76 agents were established the first year in the various Eastern markets to look after the interests of the association.

It then became necessary to provide money to carry on the business of selling until returns began to come in. Banks were asked to make loans. They responded loyally and, in the two years, 1913 and 1914, loaned over $1,000,000 for the handling of the business and for advances to the growers through the sub-exchanges. These loans were all returned at the close of the season, being paid out of the charges on each package for selling the fruit. Gradually a surplus working capital is being accumulated which, in time, will place the distributors on a permanent cash basis.

The cost of selling was to be provided for by a flat tax on each package sold. For the first year this was started on the basis of 5 cents a box for apples, 4 cents a box for pears, 2½ cents per crate for prunes and 1½ cents per box for peaches. The surplus over and above the actual cost of selling was held as a contingent fund against the beginning of the next year's operations.

The next thing to arrange for was to get a forecast of the amount of fruit to be sold, the varieties, grades, etc. The methods of collecting this data has been described in a previous chapter. The important point, however, was to have this information available several weeks be-

fore the harvesting began so the agents could get advance sales. In this manner several hundred carloads were sold before any fruit was harvested. This association, handling all the different kinds of fruit as well as vegetables, was able to keep the selling force active throughout the year, thus maintaining a permanent selling organization.

The sales policy was developed along rather broad lines. The prevailing custom had been to start off the season with as high a price as the market would stand and then drop as it became necessary to move the fruit. The distributing association did not do this, but instead started the season rather low and maintained a uniform price throughout the year. This inspired confidence among the buyers and they were not afraid to stock up heavy early in the season. The advance sales were moved out as the fruit became available. The cars were loaded with mixed varieties and grades, according to the wishes of the buyers.

Fruit that was not sold when ready to ship was either placed in storage or started East as tramp cars, trusting that the agents would be able to place them by the time they reached their destination. Such tramp cars would be consigned to some Eastern agent. A complete manifest of the contents of the car was mailed to each agent with instructions to sell at the market or a definite price might be set by the sales manager. If the car was not sold by the time of its arrival it would be placed in storage or disposed of through the auctions.

Results of the First Year.—The selling was commenced in July, 1913, and the first year a total of 6,208 cars were handled. The business comprised nearly

3,000,000 packages exclusive of the vegetables, returning to the distributors over $3,000,000 net. This fruit was shipped to 243 cities in 38 states, to 33 cities in six Canadian Provinces and 179 carloads were exported to 16 cities in 10 European countries. Of the 3,958 cars of fruit shipped, 54% started on f. o. b. order and 45% as tramp cars. Of these, 83% were delivered on f. o. b. basis, the balance being consigned or sold through the auctions.. This means that about 90% of the fruit that was started as tramps was sold by the agents before arrival at the Eastern destination. In previous years, when handled by the separate exchanges, it was estimated that less than 30% of the fruit was sold on an f. o. b. basis.

As one might expect, this organization had its difficulties. Cars were rejected. Some met with accident in transit. Some of the packs and grades were not up to standard. Claims were filed against the concern that had to be debated in court. But through it all, quite a remarkable record was made for the first year. What the final outcome will be time alone will tell. It is likely that some of the local associations will withdraw. Some of the details may have to be re-organized but the basic fundamental principles of the plan are correct.

In the first annual report of the organization is given a list of 17 reasons why the distributing association is desirable for fruit growers of the Pacific Northwest. A part of these follow that the reader may draw his own conclusions.

1. It places at the service of the grower a body of trained and experienced experts, better equipped and better informed than the buyers; it maintains a com-

prehensive and trustworthy system of gathering crop estimates and daily market reports at a cost of many thousand dollars, to adequately serve the grower; it thus puts the grower in an advantageous position in his relationship to the trade.

2. It distributes the growers' fruits, by intelligent organization, to all of the markets so as to neither oversupply nor under-supply any particular market, and provides an agency large enough to seek and find new markets as well as develop old ones.

3. It markets the growers' fruit in an extensive but conservative and economical manner and without ruinous competition.

4. It furnishes the grower with personal representatives in every important market center in America and Europe, and in fact, the world, whose first consideration is the growers' interest, who examine the fruit in transit, repair damages, and where necessary, protect the grower against improper demands for allowances, etc.

5. It secures a uniform and dependable grade and pack of the fruit throughout every district—a thing of great value to the trade and, therefore, to the grower seeking the trade—and it is thereby enabled to back the brand of each district with a guarantee that will bring a higher price for the fruit than for other fruit outside of such a brand.

6. It properly and scientifically advertises the grower's fruit and returns the full value of that advertising to the grower.

7. It gives the grower the power, backed by the exclusive service of skilled legal, traffic and claim depart-

ments, to secure justice and fair dealing in all instances from buyers, railroads, etc.

8. It removes from the methods and practices of the fruit business the objectionable and obstructive features, the strength and influence of 7,000 united growers being vastly more effective than that of 7,000 individual disinterested units.

9. It gives the grower control of his own product from orchard to market, thus enabling him to secure the handling of his fruit by the legitimate trade at an equitable cost.

10. It can, by reason of its all-district representation, supply any quantity or any variety of any fruit to meet the most exacting and preemptory demands of the trade and thus avail the grower of the benefits to be derived from such special service[1].

North American Fruit Exchange.—This is one of the latest developments in the fruit-distributing business and represents a condition different from either of the other two distributing organizations mentioned. It is much more comprehensive in its nature, taking in a wider territory and handling a much wider range of products. Instead of being located in the producing centers, its headquarters is located in New York, the chief center of markets. It is really an exchange of exchanges. Organized fruit-producing societies and large shippers controlling a sufficient value of business can become members. This is a stock corporation, but only sufficient stock was issued to cover the actual operating expenses. It was organized in 1911, under the laws of the state of New Jersey, with a capital stock of $100,000. The privilege of

[1] From First Annual Report, North Pacific Fruit Distributors, 1913.

increasing this stock was provided for as conditions would warrant. The directors in the exchange are men from widely different sections ranging from Oregon to Florida.

The kind of exchange that may become a member of this organization is without limit. Being located where the markets are, it becomes readily available as an exclusive agent for any of the other distributing societies or for affiliation with any of the other larger exchanges which already have their selling offices arranged for in the East.

The great advantage argued in favor of the location of the exchange has been borne out by records of the past two or three years. The one great object of the exchange was to maintain an efficient selling force throughout the entire year, and thus reduce to a minimum the cost of selling the fruit. By this method exchanges operating in the Pacific Northwest, in the Central and Southern states such as Texas, New Mexico, Colorado, etc., and also in the Southeastern states such as Florida and even outside of the United States in Cuba, and Porto Rico have become members of this organization. In this way the selling force has a large territory to draw from and handles almost every known kind of fruit.

In the early spring the fruits from Florida and the Southwest come in and are handled by the organization. Later, the deciduous fruits from Georgia and from the other Southern states are taken up. Then as the season advances more of the Northern grown fruits appear until finally the apple, which lasts through the winter and into the spring, when fruits of the next season again appear. Thus highly and efficiently trained salesmen are available all the year around. The markets that

demand large variety and kinds of fruits can be supplied through this one firm, and in every way it works to the interest of all concerned.

In order to become a member of this selling organization it is necessary to execute a contract in favor of the North American Fruit Exchange for all or a certain per cent of the entire output of the local association. Then they must be supplied with data regarding varieties and kinds of fruit as far ahead of harvesting time as possible. The details of the selling are handled very much the same as of other organizations.

The methods of selling the fruit are as varied as the conditions of the market demand. They have special salesmen to call upon the trade and arrange for deliveries ahead of time. They have a wide range of sales among the jobbing houses, who carry large supplies of the fruits which are handled through the smaller grocery and retail stores throughout the country. They also cater to special markets, large hotels, private trades, clubs, resorts, etc., and even strenuous efforts are being made to sell direct to the consumer. Advertising campaigns are being carried out through which the exchange advises the consuming public of the special qualities of various brands of fruit. They also maintain offices in Europe and in some of the South American countries to take care of trade in those places. Always the personal representative of the organization looks after the interest of the fruit producers, hence there is much greater efficiency and more of the personal interest in the business at hand.

Fruit Jobbers.—These people are dealers in *food stuffs* and represent a special class of produce handlers. The

buying and distributing of fruit is only a part of their work, but a part that is so important that it ought to be included in any discussion on the marketing of fruit. The great function of the jobbing houses is to supply food products to the retail grocery stores throughout the country. They are the food bankers of the country.

The fruit jobbers collect foods from the four corners of the world and pass them along to the retail stores and through the retail stores to the consumer. The average grocery store could no more buy each of its many hundred brands of food products direct from the makers or growers than each producer could sell direct to the consumer, hence the jobbers storehouses serve as intermediaries between the producer and consumer.

The jobbing houses have represented for years an organized industry that the average layman knows little or nothing about. They have their central organization, their branch houses, their buying field agents; and have fitted into the needs of the country so closely that we are hardly aware of their existence. Their business represents a sum of money equalling, if not exceeding, the fruit crop of the United States.

Their methods of operating are not much different from those of any other business concern. Their agents are sent out into the field to contract supplies, sometimes two or three years ahead of time. They visit the various canning factories and arrange for so many thousand cases of canned goods. Sometimes they even furnish the seed to grow the vegetables, and occasionally have had to buy the canning factory to get the goods put up the way they are wanted. They visit the fruit-producing sections and contract for the fruit they want. They

particularly handle enormous quantities of the various fruit byproducts. The great bulk of the f. o. b. sales made by fruit exchanges go to these jobbing houses. They keep watch of the importations and have their agents constantly at the auctions to keep the warehouses supplied from day to day.

The commodities they handle are without number, and many of the articles of food consumed daily by the average individual have been prepared for him by the jobbers in ways he is little aware of. Our favorite brands of coffee, supposed to come direct from the growers in the tropics, are usually cleaned, mixed, graded, and roasted in the warehouse of the jobbers in New York and Boston (Fig. 123). The tea from China and Ceylon, imported in great unsightly, crude packages, is put into usable and respectable looking packages before being passed along to the consumer. Olives from Spain and Italy are ungraded, unsized and packed in huge hogsheads when imported. These are put through a rigid grading process. The best olives are stuffed and placed in American made bottles. The rest are sorted to size and color, and put into various packages according to their condition.

The dates from Africa, the dried currants[2] from Greece, the cocoanuts from South America and spices from the tropics are all put through a cleaning process in the warehouse of the jobbers in this country. Few of the more intelligent of the consuming public would enjoy eating most of this imported fruit if they saw it before the jobbers made it over into presentable form. Most of the dates, figs and currants are washed, disin-

[2] Really a grape.

fected and dried by the jobbers before being offered to the public. Walnut meats are hand-brushed and then disinfected before re-packing. Cocoanuts are ground and shredded, spices re-cleaned, extracts refined in the jobbers' special warehouses. Our people have become so

Fig. 123.—ROASTING COFFEE IN A NEW YORK JOBBING HOUSE

accustomed to seeing foreign goods packed in good American packages that they have ceased to wonder at the wide knowledge of English the world over.

Business Credit.—It will be worth while to digress here slightly to comment upon the credit system built up by the jobbing business. While capital must necessarily be represented, and often in a big way, the bulk of the monthly business is conducted entirely on credit.

Take a specific product like canned tomatoes. The jobber's agent goes out to the canning factory and contracts for 10,000 cases of tomatoes to be delivered at intervals of two weeks in car lots. The canning factory agent goes to the farmer and contracts a sufficient number of acres to supply the capacity of the factory. Agreeing to pay a certain per cent of the monthly deliveries and the balance at the close of the season.

In due time the tomatoes are grown and delivered at the factory. The factory sends out its first car with a bill for cash in 60 days. The jobbers receive the goods and immediately re-sell to the groceryman or retailers and bill them for 30 days cash. The grocery sells to the consumer with weekly cash payments. At the end of the week the consumer goes to the grocery store and pays his bill for the goods. At the end of the month the retailer pays his bill to the jobbing houses. Then the jobber remits to the canning company which, in turn, makes a payment to the grower. In this manner the consumer's dollar is passed along to the producer, shrinking a little each time it changes hands.

When the country is prosperous and everybody is working at a good wage everything runs smoothly. But a panic may appear and a number of men be thrown out of employment. This makes it difficult for the retailer to collect his bills. The jobbing house has the same trouble and the canning company has to wait on the convenience of the jobber. Consequently the grower does not get his money on time. Thus hard times prevail all along the line. If such panics are not serious banks can usually be depended upon to advance sufficient money to tide over the depression. But if conditions are bad the

banks will hesitate and the business must suffer and undergo an entire readjustment.

What the jobbers have done in the way of credit in the distribution of foodstuffs the fruit exchanges are now doing in the distribution of fruit. It is simply applying the principles of a well-established business to the handling of the various fruits.

National League of Commission Merchants.—There are two or three fruit and produce organizations which represent an affiliation of business men but which, as an organization, do not attempt to do any commercial business. The National League of Commission Merchants represents an organization of this kind. Something of its methods has previously been mentioned, but its operations are so widespread and so significant that it seems advisable to further describe them.

The active membership is composed exclusively of commission men handling fruit and produce. The object of the organization, as described in Article II of their constitution, includes the following: To unite growers and producers against the enactment of damaging laws, and in favor of desirable and favorable legislation. To aid in collecting and disseminating information. To help in improving business methods. To protect against discriminations, exactions and damages to transportations. To demand the integrity and financial responsibility of the members and the protection of all, so far as possible, from fraud, misrepresentation and injustice.

The National League of Commission Merchants was formed in Chicago, in 1893, and grew out of an effort on the part of commission men of the responsible class to forestall dishonest dealing among certain types of

their own profession. Certain abuses among disreputable produce handlers were rapidly creating distrust among fruit growers, hence financially responsible commission houses were seeking to correct the trouble. A committee was formed to consider the credentials of houses before being admitted to membership. This has formed a strong membership, a list of which is always available to any grower desiring to do business through commission houses.

The membership list has gradually increased from year to year until now it comprises nearly 400 handlers of produce. These may be found in 41 different cities in 21 different states. Each firm or individual belonging to the association has to pay an annual fee of $30. These fees are turned into a general fund from which various activities are maintained. Chief among these is an annual appropriation of $10,000 set aside to maintain a business office. This is now located in New York City in charge of a manager, who looks after the business of the organization. In earlier years the president did this, but the duties have become so heavy and the difficulty of moving the office from city to city has made the establishing of a general office advisable.

The duties of the manager's office include the adjustment of transportation rates, where they appear unreasonable or discriminatory, constant vigilance of both National and State legislation, adjustment of loss, damage and overcharge and claims against transportation companies, crop conditions. It is also a bureau of general information.

Another feature of the organization is its annual convention. This is the important meeting of the society

and is held in some central city, usually some time in January. A lengthy program is provided by some of the best educators obtainable. Standing committees on legislation, transportation, membership and various national interests report at this meeting. These reports are valuable in acquainting the membership of events that may be related to their business and often valuable legislation is assisted or freak laws defeated by the aid of the League. Especially to be noted is the aid given in getting the standard barrel bill passed by the national congress in March, 1915. The proceedings of the annual convention are printed and distributed to the members and others who may be interested. This publication should be in the hands of every progressive fruit grower.

International Apple Shippers' Association.—This is an organization of operators or dealers in green apples upon their own account; that is, individuals and firms who invest their money or credit in the purchase of apples. Its operations center primarily around the apple although its members handle many other food commodities. The last roster shows over 108 different commodities handled by the members of this association. The association was organized in Chicago, in 1895, with 18 charter members. The real purpose of the association was to commercialize the apple; to improve the quality of the fruit grown; to establish uniform grades, encourage honest packing in standard packages; to correct abuses in freight rates and dishonest practices and to promote the best interests of the entire industry. No produce was handled by the association as an organization, but a great educational movement was started to advance the knowledge of horticulture and to dissemi-

nate information concerning apple conditions and markets.

The association was made international in scope to include the provinces of Canada and England and the continent. The first few years the activities of the organization were very vigorous and considerable good was accomplished. In the last decade the peculiar economic situation of the apple industry, caused by the fluctuation of the crops from year to year, has stimulated a new interest and the association has become particularly active. The membership has increased so rapidly that now every fruit section of the United States, Canada and Europe is well represented.

Membership.—Any individual or firm dealing in apples upon his or their own account whose reputation, character and financial responsibility is good is eligible to membership. The annual dues are $25, with a $10 initation fee for new members. This goes toward defraying the expense of the business office, the committees, the annual meeting, etc. Producers or growers of apples who make no purchases upon their own account are not eligible to membership although the association has done a large work in disseminating knowledge covering the methods of fruit growing. Commission houses, brokers and selling agencies who do not handle apples are not eligible. The membership Roster includes 600 fruit handlers. These are found in 39 states in the United States; three provinces in Canada, and in Denmark, England, Scotland and Germany.

The International Apple Shippers' Association maintains a permanent secretary to look after the business of the organization. This office is in Rochester, N. Y.

The amount of business handled by the secretary can be estimated by quoting a few extracts from the annual report of 1915. During the year there were handled through the office 71,855 letters, reports, telegrams, inquiries, publications, etc. The secretary traveled 10,318 miles on association business and gave numerous addresses before meetings and conventions.

The secretary also has to look after the various publications. About 3,000 copies of the official Roster were prepared and sent out in 1915. This gives the names and addresses of all the members of the association, the nature of their business and the commodities that each member handles. The report of the annual meeting has to be edited, published and distributed. This constitutes a nicely prepared pamphlet of about 200 pages and contains much information of value to both consumer and producer of apples.

Committees.—A very important part of the work of the association is that conducted by the various committees. At each annual meeting committees are appointed to look after the varied interests of the association for the coming year. Some of these committees are made up of men of keen business intellect and where kept on the same work for a period of years become powers for good in the work of the association. There are 12 permanent committees covering the following subjects: Advertising, arbitration, apple show premiums, rules for exhibits, grades, international tariffs, legislation, membership, publicity, storage in transit, telephone and telegraph, ocean transportation, and domestic transportation. These committees work in cooperation with the president and executive committee.

Among the things fostered and helped to successful conclusions might be mentioned the following: (1) The enacting of the Sulzer Bill into law, establishing a National standard apple barrel and standard grades for apples. (2) The New York and Massachusetts apple grading laws. (3) The National law establishing a standard barrel for fruit and vegetables. (4) The privilege of allowing long distance shipments to be stopped and stored in transit and re-shipped later without materially increasing the cost. Many freak laws in transportation and cold storage have been helped to the museum. The night letter rate of the telegraph companies was instigated by the help of the association. The list could be extended indefinitely, but enough has been given to indicate the importance of the work of the committees. The work of the association along the line of standard grades and packages has been of very great value. It has "blazed the trail" and led the way.

Statistical Work.—Another very important part of the work of the association is the gathering of statistics. This is handled through the secretary's office and consists of reports of fruit in storage and estimates of the prospective crops. These statistics are published in special reports and distributed to the members of the association. Estimates of crops are comparatively easy to get as the association has a good membership in every producing apple section in the United States—men that are directly associated with the business and are qualified to get accurate data. This ability to forecast the size of the apple crop, exerts a valuable influence in stabilizing the markets. It prevents the wonder-mongers from cheaping the product by constantly talking bumper crops with the attended oversupply.

The Spy.—This is the name of a monthly publication put out by the International Apple Shippers' Association. It is edited by the secretary and articles are contributed by various members of the association and others. Reviews of the work of the various committees, extracts from bills before the state legislatures and Congress affecting the apple industry, special articles, export movement, and, in short, the entire field is covered. Altogether much information of value to both producers and distributors is thus disseminated. The mailing list is large including both members and non-members.

Publicity Committee.—Through the efforts of this committee, National Apple Day, the third Tuesday in October, has been firmly established and widely celebrated from ocean to ocean. Splendid publicity has thus been obtained for the apple. The amount of advertising thus obtained has been almost invaluable. The International Apple Shippers' Association is especially fitted for this work. It has a local chairman in every city of any size in the country and in this way gets action. Two silver cups, known as National Apple Day Trophies, are offered for the best celebration of the day. One is limited to cities of 500,000 and over, and the other to cities under 500,000. Last year there was but one cup, which was won by Cincinnati.

Advertising Agencies.—Only in recent years have efforts been made to increase the consumption of fruit by means of advertising. Fruit growers and sellers have been accustomed to seeing advertisements of all manner of things but never thought that the same principles that would sell postum or coca-cola would sell fruit. The fruit jobbers have for years advertised their special

brands of coffee, tea, spices, etc., but fruit has been neglected. Individuals like J. H. Hale have made an enviable reputation by advertising and various trade-marks appear from time to time, but their efforts have been feeble with no permanent results.

In 1912 the International Apple Shippers' Association added an advertising committee to its list and instructed it to investigate the possibilities of advertising the apple industry. With an appropriation from the society and donations from individuals and organizations, $900 was available for the initial start. It was at once foreseen that with an apple crop averaging about $100,000,000 annually and distributed over such a vast territory, that the task would be no easy one. It was also foreseen that if the advertising was to stimulate consumption that the interests of the consumers would have to be reached.

How to do this and maintain funds for the work was a big problem. The first efforts were directed at the retailers. About 13,000 retailers were advised that if they would run a bargain counter of apples, the sales would greatly increase. Most retailers expect to make about 100% profit on the fruit they sell. The poster given out by the association explained that if they would reduce the price so as to make only the legitimate 10 or 15% profit, that sales would increase and the total profit would be greater for each day. A number of the retailers saw the wisdom of this and tried the experiment with very satisfactory results. Many reported that the sales had increased from 5 to 50 times.

Fruits as a Food.—The next step was to place before the consumer such literature as would create a desire

for the fruit. A little booklet was printed entitled "197 Ways to Prepare the Apple," and sent into the homes of the consumers. At first these were distributed among the families of the larger cities. An effort is now being made to place one of these books in the home of every family in the United States. Nearly 100,000 copies have already been sent out.

Some of the fruit exchanges and selling organizations are doing the same thing with other kinds of fruit. The California Fruit Exchange has a booklet on numerous ways to serve oranges and lemons. The Hawaiian Pineapple Company has a pamphlet giving 100 ways of using the pineapple. Armour & Company have a booklet giving many recipes for using their grape juice. And so on, all with the idea of keeping their particular goods fresh in the minds of the consumer. And results have amply justified this method of advertising. And what is still more important from the standpoint of the salesmen is the fact that the quantity sold is increasing from year to year.

Apple Advertisers of America. — Advertising the apple developed so rapidly that it soon outgrew the committee appointed by the International Apple Shippers' Association and a special organization was formed. This took shape as the "Apple Advertisers of America." The members of the advertising committee became officers of the organization and regional vice-presidents and members of an advisory board were appointed representing every important apple section in the United States. Then following the incorporation of the advertising association appeared an official organ in the shape of a monthly publication known as the *Apple World.*

This was to foster the work of advertising and to publish articles contributed by members of the advisory board. This paper has now appeared more or less irregularly since 1914 and has done considerable good in aiding apple advertising.

The Stamp Plan.—To effectively continue the work of advertising revenues had to be provided. To accomplish this the stamp plan was devised. Neatly lithographed stamps were secured of 1- and 2-cent denomination. These were put up in books of 100 each. The 1-cent stamp book sold for $1; the other for $2. The idea of their use was to place a 1-cent stamp on each box of apples sold and a 2-cent stamp on each barrel. While the stamps in no wise guaranteed the contents of the package they attracted attention by indicating that the seller belonged to the Apple Advertisers' Association. About $3,000,000 worth of the stamps were first issued and placed in the hands of a trust company for distribution. In this way funds were to be provided to help along the work of advertising.

The sale of stamps was to furnish the revenues to carry on an extensive advertising campaign. The services of experts were to be secured and definite plans marked out. Various kinds of advertising literature were to be printed, calendars devised, advertising signboards, signs for street-cars, etc., were soon to show to the public the advantages to health and happiness by eating apples. Still further, trained newspaper men were to be employed as press agents. In the language of the manager of the work: "Articles will be prepared by the best writers of the country for the feature section of the Metropolitan Sunday papers. Health and beauty articles will be pre-

pared by noted doctors, health commissioners and others, to be published in the big magazines. Picture slides will be thrown on the canvas while reels are being changed. Motion plays featuring apple cookery will be prepared. Display advertisements of American apples, with mottoes like 'An Apple a Day Keeps the Doctor Away' will be distributed among retailers particularly." In fact, just such a campaign as would be conducted to sell corn flakes or postum, will be inaugurated.

All of these efforts, while fundamentally sound in principle, failed hopelessly in so far as material results were concerned, because the producers did not support the movement. The stamps were not sold, hence no revenues were available to carry on the work.

Some of the fruit exchanges and distributors are now endeavoring to reach the consumer direct through special advertising. One plan that has been in operation for some time in California is to offer premiums for the return of so many wrappers of oranges. Another plan used by a cured fruit association is to ship by parcel post so many pounds of prunes or raisins for a stated sum. Display advertisements announcing this plan appear in almost every family paper or magazine. Another plan now in use by the Northwestern Fruit Exchange is the issue of a little booklet advertising their brands and giving colored lithographs of the best apples and a short description of their best uses and when to buy them. Following the pictures is a price-list for which the various grades and varieties will be delivered at the consumers door.

Results of these methods of advertising have already been far-reaching, and 1914 was a year of unprecedented

apple crop. The yield was probably never before reached in the apple industry, yet the movement of the crop was regular and without confusion. The prices were not so high as in former years, still sufficient to warrant fair returns for the money invested. Prices ran steady and even, and the distribution was uniform. Intelligent advertising and broadminded business methods were responsible for this unusual situation. Accurate statistics, even prices, uniform packages and standard grades have inspired confidence in the buying public, and advertising has created the demand.

Gathering Statistics.—Reliable figures on fruit crops have ever been hard to get. This has been due in part to the perishable nature of the product, also to the lack of any well-organized effort in collecting data. Something has already been mentioned of the efforts of the International Apple Shippers' Association in gathering statistics on the apple, but these do not include any of the other fruits. As the market prices depend largely upon the quantity of the fruit harvested it is highly desirable to get an accurate forecast of the conditions of the crop. The more information that can be placed in the hands of the producers and distributors of the fruit the greater the opportunity for getting equitable returns for the labor involved.

Government Reports.—For years the United States government has maintained a department for reporting crops. This has been under the auspices of the Agricultural Department and includes reports on all the important agricultural crops. This work has been collected largely through the Post Office Department and through the efforts of special field agents. Printed

blanks containing a number of questions and places for answers are sent to each post office and the one in charge has had to fill them out and return to the office of crops. From these reports monthly bulletins are compiled and sent to the various papers where they are printed and sent out to the public. Also a regular mailing list is furnished with these bulletins. These reports are valuable as they indicate the general crop conditions, but they are not sufficiently accurate to make a working basis for handling the fruit crop.

Once in 10 years the Government takes a census of the country, which includes the horticultural products. These serve as guides for the general trend of the fruit business but give nothing much to help the marketing situation. The system of tariffs and revenues makes it necessary to keep accurate records of the imports and exports and their respective value. This information is desirable and of value as an after consideration, but it serves only as a guide and gives no definite advance information.

A number of the larger exchanges have their statistical department where they can get advance information from their own members. While this serves their own business admirably it does not add to the knowledge of the public until too late to be of any direct benefit. Such exchanges usually hold their own information more or less of a secret until it has served its purpose.

Market Reports.—The reports of the prices of farm commodities that appear regularly in the daily papers and agricultural journals are collected in various ways. Very few of the large daily papers have an expert to cover the markets and collect material for reports. Some

of the agricultural papers collect data from the local markets but usually prefer to buy the information from those who make a business of collecting it.

Board Commodities.—The produce listed by the various boards of trade is known as board commodities. These constitute the less perishable products such as: Grain, foodstuffs, potatoes, butter, cheese, etc., but in no cases fresh fruit. The commodities have the prices fixed every morning by the board of trade in the various cities. The representative of the Associated Press in each of the cities get these prices each morning after they have been fixed and they are then distributed over the country to the daily papers. In this manner most of the large dailies get rather accurate information on all board commodities but nothing covering fruit products.

Fruit Commodities.—Market reports for the fruit products have to be collected from day to day as best they can. This information can only be had from those who handle the goods. And not all produce houses are willing to furnish this free. There are in all of the larger cities, trade or produce journals which have their experts to cover the markets and get the sale prices of the fruit. This is done in several ways. The agent can visit the auctions and make notes of the sales. They can arrange with the larger commission houses for daily reports. They may also cooperate with the fruit exchanges or distributors to get the desired information. For the shipments into the cities the freight departments of the railroads are available, as they have to keep such information on file; for foreign shipments, steamship companies furnish the information. All this calls for an expert knowledge of the city and surrounding

conditions; also one with strong enough personality to win the confidence of the dealers, as there is always information that the market expert would get and if made public would be detrimental to the interests of the produce handlers.

Prices quoted in the dailies are usually wholesale. They do not represent what the producer gets nor what the consumer pays, but a general medium somewhere between. The commission house would report what the fruit sold for. The producer would get what was left after freight, commission, cartage, etc., was deducted. The jobber's prices would represent the same, as they buy most of their products on an f. o. b. basis. The auction quotations would also be the same, less freight and commission to producer.

To the consumer the profits of the retailer must be added to the sales quotation. This is never less than 15% and usually about 40% and not infrequently 100%. Market quotations are always valuable as a guide to the producer, but the more the grower can know of their methods of collection the better will be his chances of getting what his fruit is worth. Each producer must make a close study of the market reports.

CHAPTER XII

FRUIT SHOWS

Objects.—Fruit shows are one of the more recent developments in horticultural progress. Every fruit-producing section now boasts of its big shows, and so important have they become that they must be considered as an essential branch of the fruit industry. The objects to be obtained by such exhibitions may be classified under three heads: (1) To advertise some fruit or fruit-producing section. (2) To stimulate an interest in fruit growing. (3) To disseminate knowledge. All three are worthy objects and past results have justified the claim that fruit shows are a good criterion of the energy and ability of the people giving them.

Fruit exhibits give the growers a chance to get together, display their products and to match their skill with their neighbors in the production of fancy fruit. This stimulates an interest in the business and creates a desire on the part of the weak or unskilled ones to grow better fruit. The display of varieties, the kinds of packs and the style of packages gives the growers a chance to observe and make use of those suited to their needs. Occasionally programs are arranged on topics of interest along horticultural lines; thus knowledge is spread. Buyers are attracted to the shows, and sales are often made during the exhibition. Newspapers send their reporters and, if of sufficient importance to warrant, considerable space is given to the show. Prospective in-

vestors in fruit lands take such occasions to visit the place and investigate its importance as a producing section.

How Held or Managed.—The methods of handling fruit shows are as numerous as the varied fruit-producing sections. The larger ones are held under the auspices of a regular fruit show organization. The National Fruit Show held annually at Spokane, Wash., is an example of this type. It represents a stock company and is incorporated under the laws of the State of Washington. The admission fees and revenues from the various concessions make the organization self-supporting or even dividend paying. Different fruit-growing sections often hold their own annual exhibit. Such are supported by the growers in the particular section. Where such sections are large and the business well developed the show becomes an event of state or national importance. Often real estate or transportation companies get up exhibits to attract buyers to the section, to help sell their land and contribute to the support of the railroad.

Often the show is held in connection with some existing organization. Probably the majority of the smaller ones are managed in this way. State and county fairs have exceptionally fine displays of fruits and vegetables, and such represent the oldest type of fruit shows in the United States. Agricultural and horticultural societies may have displays of fruit in connection with their annual convention or their important meetings. Pomological societies, fruit growers' conventions, granges and other similar organizations often foster quite extensive exhibits on special occasions. Probably the latest developments along this line are the land shows held in the

larger cities. At such times the products of the land are collected together from large areas and displayed for the benefit of the public In fact, fruit shows are becoming so important and so numerous that if one choses he could get a liberal education on fruit growing by attending the various exhibits.

The time that most fruit shows are held must naturally be in the fall or early winter so there will be ample material for exhibits. In some instances the displays are maintained the year around. Real estate companies, chambers of commerce, boards of trade, etc., often maintain permanent exhibits. In such cases the more perishable fruits are preserved in liquids which keep them for a long time without deteriorating. So skilled have their processers become that the fruit can be kept for several years without the loss of the most delicate shades. The Pacific Coast states have exceptionally fine collections of these processed fruits. For example, the "California Development Board" maintains an exhibit in San Francisco representing every county in the state. Visitors at any time can see the fruits of the entire state without having to travel over the fruit sections.

Exhibits.—Good exhibits are essential to a good show and not always easy to obtain. Specimens of fruit can best be selected by the grower or handler of the crop and some inducement must be offered to create a lasting interest, and so premiums or prizes are offered to attract fruit for exhibition. In sections where shows are held for the first time considerable effort must be put forth on the part of the management to have the exhibitors understand just what is wanted. The ideas of orchardmen differ widely on such subjects, and unless they un-

derstand clearly just what is desired unpleasant feelings may be created and the whole purpose of the show will be defeated.

Premium List.—The list of premiums is always decided upon several weeks in advance of the time of the show. It is printed, giving the different classes for which prizes are offered and the amount of the premium

Fig. 124.—7,000 BOXES OF APPLES DISPLAYED UNDER A TENT, WATERVILLE, CAL.

after each class. If the show is a large one the prizes will have to be correspondingly large in order to create sufficient interest to get good competition. In many cases premiums as high as $100 are awarded for first or sweepstake prize.

The classes into which the fruit is divided must be clearly defined. There may be as few as 10 or as many as 100, depending on the territory covered and the size

of the exhibits. For each class there are two and sometimes three prizes, listed as first, second and third. If the first premium was $25, the second would be $10 and the third $5. Each one being 50% or less of the preceding one. The most important class heads the list and the rest follow in their order. Where boxes are the chief package used they are placed in groups of 5, 10, 25, 100, and sometimes 500 or a carload.

Each different group then becomes a separate class on the premium list. Where the shows are small and both boxes and barrels included, 10, or occasionally 25 would represent the largest number in any single class. Frequently single box premiums are offered. In all classes representing marketable packages the premium list specifies the commercial pack because the way the fruit is packed and the kind of package is considered in awarding the premium. The idea is to have the specifications conform as near as possible to the requirements of the best sellers on the general market.

Plate exhibits, where perfection of the fruit alone is the chief consideration, may constitute a number of classes. The usual plate contains five apples although plates of 12 each are sometimes used. These may fall into several groups of single plates only, or in groups of 5, 10 or 15 varieties each. Other classes would be displays from organizations, such as exchanges, societies, granges, counties, etc. These types are usually listed in the premium book as the best single display containing 5, 10 or 15 varieties of fruit.

Another class is what is usually termed feature displays. These represent certain well-known objects of political or historical interest, built up out of fruit or

fruit products. Such give an opportunity for the builder to draw on his ingenuity or imagination to construct something that will be attractive and appropriate. The premium list may also include the numerous fruit by-products. Dried fruits, beverages, vinegars, jellies, canned goods of all kinds may be represented in this class.

Other Information.—Each class with its numerous subdivisions is systematically arranged in the printed form with the premium following each one. There is also complete information on all requirements made by the management. Directions on how to reserve space for displays, the rules for making entries, the size and kinds of packages that can be used, are included. The time limit set for the placing of exhibits, how the premiums will be awarded, and any varieties of fruit that are to be excluded are explained in the preliminary notice. It is advisable also to state who the judges will be and give the scale of points to be used on the official score card. The more specific and full the information can be the less the chance for dissatisfaction among exhibitors.

Securing Premiums.—The money to pay for the premiums is arranged for before the premium list is sent out. This is provided in various ways. Where the show is handled by a business organization, admission or gate fees will usually take care of the premiums. Where admission is free and the work is purely educational other means must be found. Where the shows are held in large towns or cities business men are willing to subscribe under most conditions. Boards of trade, chambers of commerce and even the city in which the show is held will often contribute. City officials, railroad companies,

trolley lines, and the various industrial organizations may contribute cups or prizes of various kinds. Sometimes individuals will offer cash prizes for a single box or barrel with the understanding that he is to get the package that wins the prize. Such represents a larger sum than the probable commercial value of the package. There are innumerable ways by which a competent management can provide sufficient funds to cover the awards. Care is taken, however, that the requests for funds do not become so numerous and the sums so large that the business people become disgusted and refuse to contribute.

Selecting Fruit for Exhibits.—Fruit for show purposes can best be selected during harvesting time. Extra-fine specimens for plates can be laid to one side during the process of harvesting and given special attention to keep them in good shape. Fruit for boxes or barrels can be set aside and given extra care later. It is necessary to handle fruit for show purposes with every possible care. The bloom ought not to be disturbed, and it is unnecessary to state that no bruises, blemishes or marks of any kind are permitted. If gloves could be worn in handling the fruit less injury would result.

Commercial packs must conform in every way to the requirements of the market. The packages are standard and extra care is taken to make them neat and clean. The grades conform to the laws or customs of the community in which the show is held. In box-packs the apples are all wrapped except the top layer. The management of the show specifies on all such points. If barrels are used the same precautions hold true. A dirty or careless package may spoil the chances for a

prize. The fruit may be either packed at home or shipped to the show and packed by experts, the latter is usually the better, as good packs may be disarranged by rough handling in shipping.

The fruit selected for the exhibit is best placed by itself as soon as picked and graded. When the time for the show arrives it is re-graded and carefully examined for blemishes of all kinds. Scab or scale-marked fruit is rejected. All stems should be intact, and no limb bruises or blotches show. After this is done, the owner or packer grades for size and color. Each package then is as uniform in these respects as possible. Many shows specify what the standard sizes of the different varieties is to be, in which case the exhibitor adheres strictly to the rules. Unduly large fruits should not be placed in commercial packs for that which is discounted on the general market will be discounted by the judges. And the market does not care for oversized specimens. In plate exhibits uniformity in size and color markings are looked out for. Fruit may vary naturally in color yet uniformity in each separate plate is necessary. Overcolored or undercolored specimens are usually discounted.

When the selection is all complete the packing may begin. Barrels and boxes may be packed before sending. Most judges allow for the ordinary box bruises, so such will stand an even chance with those packed after reaching the show. Long distance shipping in barrels for exhibition seldom pays. Boxes may be placed in straw or excelsior in barrels. If sent to the exhibition and then packed, about 15% more fruit is sent than is intended to be used, to allow for bruises or damages in shipping. For plate specimens, each separate fruit is

Fig. 125.—A CARLOAD EXHIBIT AT THE NATIONAL FRUIT SHOW, SPOKANE, WASH.

wrapped in tissue paper and carefully packed in boxes for shipment. It is always best for each exhibitor to place his own fruit at the show, but where this cannot be done the management always provides someone to place them for him.

Arranging Displays.—The best way to place the exhibits will depend upon the size of the show and on the space available. Almost every possible arrangement will come under one of the three methods: booths, tables or racks. Booths are best for the larger displays and lend themselves to a variety of conditions. Organizations of various kinds, local exchanges, granges, real estate companies most often make use of booths. A framework is placed around the outside and then covered with bunting or some cheap material with the proper color to best

show off the display. A careful study of the color scheme and the selection of just the right shades will often make the difference between success and failure.

Racks are best used for box exhibits, and tables for plates and similar displays. The position of both is studied with reference to light. The effects of light by day and gas or electric lights by night are quite different. Often displays lose in attractiveness because of a too glaring light. A soft, diffused light is preferable to insufficient or harsh lights. The best position for racks is at an angle of about 45 degrees and high enough so the average man cannot look over the top. If too flat or too straight the view will not be as good, and part of the effectiveness lost. Tables can be arranged in most any way that will give good light with ease and convenience for examination. The more isolated each class can be, the better will be the general effect. If plate exhibits can be set off in a corner or in a room by themselves better results can be had.

Advertising.—All shows to be a success must be well advertised. This is the work of the management, and if

Fig. 126.—A NEW ENGLAND BOX AND BARREL DISPLAY

properly done calls for considerable time and study. Several methods are available for this work, such as the use of posters, handbills, street-signs, paid advertisements and news articles. In some way the show must be kept constantly in the minds of the public. Newspapers are willing to print everything that will pass as news. If the articles are cleverly written, considerable space can be had which amounts to free advertising. When the meeting is called to arrange for the show, notices may be given to the papers. This is repeated when the premium list goes out. Press notices should be furnished from time to time on different organizations that are preparing exhibits. Properly designed handbills are sent out from one to two weeks previous to the opening.

If there is to be a program this may be printed sev-

Fig. 127.—PHOTOGRAPHS OF ORCHARD SCENES HELP FRUIT SHOWS

eral times in the papers. During the last four or five days preceding the show, press comments on parts of the program will help. One or two speakers of state or national reputation are preferably selected. Then their picture with a few comments on their work and ability just before the show opens will attract wide attention. Such work is written by the management and furnished the papers, all ready for publication. When the opening day comes, large street-signs giving directions where to go, placed near railroads or public places, will attract strangers who happen to be in the town. If an admission fee is to be collected much more attention will need to be given to advertising.

Side Issues.—There are many extras that may properly accompany a fruit show. Concessions of various kinds are sold to people who habitually follow such exhibits as a means of livelihood. Lunch counters, soft drinks and novelties of all kinds are to be found at every large show. In some places there is a regular midway with all of its attendant rabble. These concessions are regulated by the management and contribute considerable money toward the support of the show. Floor space is also in demand by companies who manufacture articles used in horticultural practice. Spray machinery, chemicals, fruit packages, nursery stock, and the many orchard tools are only a few of the many side exhibits that may legitimately accompany a fruit show.

Manufacturers of fruit byproducts can profitably make displays. Canned fruit, preserves, jellies, and beverages are put on as exhibits for the purpose of advertising the goods. Where there is a special women's section in the show there is no end of articles used in the domestic

economy of the home that might not be displayed. Sometimes the management, desiring to make more money, handles the concessions themselves. Lunch counters or short order meals constitute their chief venture. One national fruit show had a mammoth pie machine that would turn out 1,000 pies an hour. These were sold to the crowd at a good profit. Such shows have from 5,000 to 10,000 paid admissions, and are able to do things on a large scale.

Feature Exhibits.—A display of this kind consists of some special design imitating a place, a building, or some well-known feature of the fruit section. They are designed in such a way that a number of the different

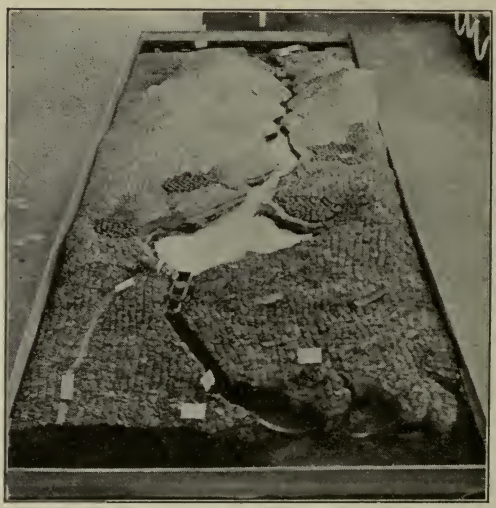


Fig. 128.—THE PANAMA CANAL BUILT OUT OF DRIED APPLES. WATSONVILLE, CAL.

Fig. 129.—AN ATTRACTIVE BOOTH WITH PAINTED SCENIC BACKGROUND, SPOKANE, WASH.

fruits or fruit products can be used in their construction. Their primary object is to advertise the fruit with a secondary one of calling attention to some particular phase of place or state. Sometimes the state emblem could be used. Real estate men thus advertise their lands, resorts, their hotels or casinos. Such features may be participated in by school children or by boy's and

girl's clubs. A feature design representing the Panama Canal was built by high school children and was designed to be topographically correct (Fig. 28). It took the first prize on feature exhibits of $200.

Feature exhibits attract wide attention, and when well executed are good advertisers of a fruit section. Newspapers and magazines are always glad to use photographs of the features, as they represent news. Such displays are carefully sketched on paper ahead of time so as to

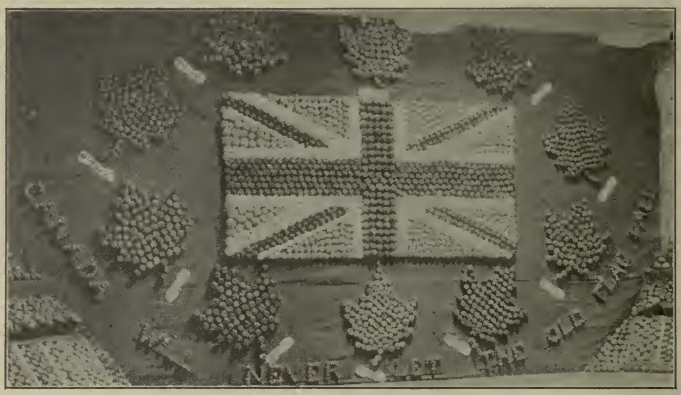


Fig. 130.—FEATURE DISPLAY. NEW BRUNSWICK, CAN.

get the right proportions. The framework is then built of wood or wire and the fruit put on as late as possible before the opening day. Good features call for a considerable amount of time and money but they are representative of the highest in fruit display work. Where used for the first time the efforts are usually towards the smaller and simpler designs, giving opportunity for development in succeeding years.

Judging the Fruit.—The examining of the fruit and the awarding of prizes is the most delicate problem in the handling of fruit shows. Exhibitors are sensitive and are quick to take exceptions to any decision unfavorable to their own interests. The management must be alert to such difficulties and provide competent judges to examine the fruit. Any question of doubt must be foreseen, if possible, and rules governing such points incorporated in the premium list. Where such are omitted the judges are instructed on each particular case as it arises. After one or two years the rough places are smoothed out and the people become satisfied as they become more liberal in their views.

Fig. 131.—A FEATURE DISPLAY
National fruit show. Spokane, Wash.

The Judges.—The judges are usually men with more or less technical training, and are repre-

sentatives of agricultural colleges, government service, or some fruit-handling organization. They, ordinarily, are men of wide experience and of much traveling, and familiar with a great variety of conditions. Many judges for large shows are men of prominence, who are not accustomed to much physical work, and who are in the habit of turning over details to clerks or subordinates. Often the work must be done in the presence of noisy crowds. A man's judgment may be keen and active at the beginning of the work, but at the end of the day becomes fagged from pure exhaustion.

In most cases judges get no pay except sufficient to cover traveling expenses, considering that the experience and knowledge gained will offset the loss of time. Most shows cannot afford salaried judges, yet many dollars in prizes, good will and prestige depends upon the opinion of the ones examining the fruit. Exhibitors are often critical, and it is only right and just that they should know how their fruit scores and wherein they may improve another year. Score cards are best left with the exhibitor or placed on file to be reviewed or studied over. Such work is largely educational, and were it not for the fact that the various educational institutions so considered it and allowed their instructors to go on with such work without loss of time, fruit shows would find competent judges hard to get.

Score Card.—The score card giving the scale of points on which the judges are to award the prizes is always prepared ahead of time. It is best to include this information in the premium list so the exhibitors can place their fruit with the importance of the different points in mind. The score card is based on a percentage of

perfect pack or fruit. Either 100 or 1,000 points may be used, the latter preferably. Each different class will probably call for a different set of weights for each point. Where commercial packs are specified the perfect pack is considered as the one that would bring the highest price on the market. Each particular feature that the buyer would consider is weighed separately, according to its importance. The sum total of these points represents the ideal or 100% perfect.

The score card for the fruit, not associated with a market question, represents more the ideal in the minds of the judges to which the variety is supposed to conform. Other classes may need to have special score cards prepared to meet the needs of the occasion. In the case of feature displays the judges devise some means of comparison to cover the particular feature under consideration. There are many different kinds of score cards in common use in the different fruit sections of the United States. In nearly all cases the important points covered are the same, differing only in the relative weights given the different points. Efforts have recently been made to combine these into a universal score card for all conditions. Through the efforts of the Society of Horticultural Science such a score card has appeared.

Judging the Fruit.—With this very elaborate schedule to go by, all the judges have to do is to examine the package and see how near, in their judgment, it conforms to the standard. While this appears very easy to do, it is, in reality, very difficult. Men do not often think alike, hence two or three judges are better than one, as their opinion represents an average. Where there

are several hundred or a thousand boxes to examine, two or three days' time will be necessary to go over them with the painstaking attention to details necessary.

The details of examining a commercial box pack is not difficult to comprehend, but calls for careful work and an acuteness of judgment, which is altogether too often lacking. Having a copy of the official score card and a list of the classes of exhibits, the judges proceed to the racks and begin examining the fruit. Where the box entries are numerous it is impractical to go through every box. Of the 50 box entries, 10 are usually examined; of the 25, five; of the 5, two, and of the single box entries it is customary to examine but half of the contents of each box. The judges work together. On the single box exhibits they score one at a time, finishing each variety before commencing on the next. Of the entries of five or more each judge takes a box, being careful to keep the same relative number for each one. The average then stands for the final score. The various entries are listed by number, and the name of the exhibitor kept off until after the prizes are awarded.

Fig. 132.—EXAMINING THE BULGE

SCORE CARD FOR SWEEPSTAKE PRIZES

Or other competitions between different varieties of packed fruit.

BOX

Fruit		*Points*
Texture and flavor	100	
Value of variety	100	
Size and form	100	
Color	120	
Uniformity	100	
Freedom from blemishes	130	
Total		650
Package		
Material	30	
Marking	10	
Solidity (Nailing, cleats, etc.)	10	
Total		50
Packing		
Bulge or swell	100	
Alignment	20	
Height of ends	60	
Compactness	80	
Attractiveness and style of packing	40	
Total		300
		1,000

BARREL

		Points
Texture and flavor	100	
Value of variety	100	
Size and form	100	
Color	100	
Uniformity	100	
Freedom from blemishes	150	
Total		650
Heads	10	
Staves	10	
Hoops	10	
Nailing	20	
Marking	20	
Total		70
Facing	80	
Tailing	50	
Pressing	70	
Packing	80	
Total		280
		1,000

FOR BARRELS AND BOXES OF A GIVEN VARIETY

BOX

Fruit		*Points*
Texture and flavor	100	
Size and form	100	
Color	150	
Uniformity	150	
Freedom from blemishes	150	
Total		650
Package		
Material	30	
Marking	10	
Solidity (Nailing, cleats, etc.)	10	
Total		50
Packing		
Bulge or swell	100	
Alignment	20	
Height of ends	60	
Attractiveness and style of packing	40	
Compactness	80	
Total		300
		1,000

BARREL

		Points
Texture and flavor	100	
Size and form	100	
Color	150	
Uniformity	150	
Freedom from blemishes	150	
Total		650
Staves	10	
Hoops	10	
Heads	10	
Nailing	20	
Marking	20	
Total		70
Facing	80	
Tailing	50	
Pressing	70	
Racking	80	
Total		280
		1,000

SINGLE PLATE SCORE CARDS FOR FRUIT OF A GIVEN VARIETY

APPLES AND PEARS

	Points
Form	15
Size	15
Color	20
Uniformity	20
Freedom from blemish	30
Total	100
Quality when scored	25

PEACHES AND CHERRIES

	Points
Form	10
Size	20
Color	25
Uniformity	20
Freedom from blemish	25
Total	100
Quality when scored	25

PLUMS

	Points
Form	10
Size	25
Color	20
Uniformity	20
Freedom from blemish	25
Total	100
Quality when scored	25

QUINCES

	Points
Form	15
Size	20
Color	15
Uniformity	20
Freedom from blemish	30
Total	100

GRAPES

	Points
Form of bunch	10
Size of bunch	15
Size of berry	10
Color	10
Uniformity	10
Freedom from blemish	20
Quality	20
Firmness	5
Total	100

COLLECTION OF FRUITS WITH SPECIFIED NUMBER OF PLATES

	Points
Value of varieties for purpose stated	50
Condition of fruit (Average of individual plate score)	50
Total	100

LARGEST AND BEST COLLECTION

	Points
Number of varieties	33-1-3
Value of varieties for purpose stated	33 1-3
Condition of fruit (Average of individual plate score)	33 1-3
Total	100

In judging a commercial box pack the first consideration is usually the package. The box is looked over critically. Anything that might detract from a good appearance is noted. Soil marks, use of weathered boards, bad or unsightly knots, carelessness in nailing are summed up, and each one is marked off in proportion to its value on the official score card. The next step is to study the way the fruit is placed in the package. The bulge calls for 100 points and is the most important, as upon it depends the ease in which the fruit will carry to market. This bulge needs to be at least an inch above the box at the center and form a regular curve to the ends. If the apples do not come above the box, all is marked off; if only half enough, 50 points are taken off, and so on. If one side is higher than the other, or the curve is not regular enough, points are taken off to indicate the defect. This is a matter of judgment for the judges, but seldom will two fail to agree on any one point.

Fig. 133.—JUDGING COMPACTNESS

Fig. 134.—TESTING FOR END PLAY

The height at ends comes next. The last row of apples at the end of the perfect box projects from a fourth to three-eighths inches above the end, and a strip laid on top will run parallel to the box. If these run too low or too high or are uneven they are marked off accordingly. The compactness is tested by placing the hands on the top of the fruit and testing the give under pressure and the side movement (Fig. 133). The hands are then run down at the end of the box to see if there is any end play (Fig. 134). If the hands can be forced down to

the bottom of the box all the points are marked off. This denotes a loose package, which will be ruined in shipping to market.

The alignment and attractiveness are usually considered together. The rows run straight and true in both directions. The attractiveness has to do with the style of the pack, the arrangement of the fruit on side or end to give the neatest appearance. The wrapping papers are looked at, the way they are put on, etc. The box

Fig. 135.—EXAMINING FOR DISEASES, INSECTS OR BRUISES

liners are studied, and points are deducted to represent the detraction from a perfect appearance. Good looks are as important in the selling of fruit as good clothes are to a marriageable daughter.

When the packing has been examined sufficiently, then the judges turn their attention to the fruit itself. From a half to a third of the apples are taken out of the box, the wrappers removed and each apple examined for insect injuries, bruises, fungus marks, scale, etc. (Fig.

135). For each blemish noted one point is deducted from the 150 points allowed for this purpose. If half of the box is examined and 10 blemishes discovered, this would be multiplied by two for the entire box and the total, or 20 points, be deducted. Occasionally the rules of the show are to exempt marks that are the result of lid pressure in nailing up the boxes for drayage or shipment. Manifestly it would not be right to disqualify a commercial pack for the so-called "box bruises" result-

Fig. 136.—TESTING FOR UNIFORMITY

ing from shipping, because no pack has been found which will entirely eliminate them.

The apples which have been unwrapped are piled back in the box and studied for uniformity (Fig. 136). If more than one size is found they are scored off in proportion to the number that vary. The size refers to the commercial value of the apples exhibited. Unduly large specimens are discounted on the general market just the same as if they were diseased. On the other hand, apples

sufficiently small to run over 150 to the box are not wanted. Therefore, oversized and undersized varieties are scored off in proportion to their variation of the market standard.

The color of the fruit must be uniform. This may vary from box to box in the same variety, but should not vary in the same box. Where the top layer is not wrapped, highly colored specimens are all turned with the blush in the same relative way. A variegated color arrangement often materially detracts from the appearance. The value of the variety is a comparatively new requirement and is usually inserted where boxes compete for sweepstake prizes. This is to prevent undesirable varieties from getting first place.

Texture and flavor is the one doubtful Jonah to judges. Obviously they could not sample or taste apples from 1,000 to 2,000 packages. Any way, there is no accounting for taste. What one judge may like another one would throw out. Besides, apples which are at their best at widely different times come together in competition at the same time, giving an unfair distinction. Judges usually get around this vexed question by marking all entries perfect in texture and flavor, unless there seems to be some gross departure from the average accepted types.

Those who have thus far followed this article will see that the task of a fruit judge is no easy one. The details are exacting and each point must be carefully considered. After the entries have all been examined the judges then retire and total up the scores. Those ranking the highest are taken to the management of the show and the number is then affixed to the name of the exhibitor and

the judges for the first time know the names of the people whose fruit they have been scoring. This, together with the fact that usually the judges are outside men who have little knowledge or acquaintance with the people holding the show, leaves but a remote possibility of unfairness to the exhibitors.

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